

815-6.

OCT 27 1932

BETTER BUILDINGS

A decorative flourish consisting of a long, sweeping line that loops around and ends in a small circle.

TENTH EDITION

FRANKLIN INSTITUTE
PHILADELPHIA

THE SUNSHINE LITERATURE

STUTTGARTER VERLAG
ALBRECHT KUNST

BETTER BUILDINGS

TENTH EDITION



ROOFING CATALOG

A Booklet of Information Relative to the Uses of Formed Metal
Roofing and Siding Materials

AMERICAN SHEET AND TIN PLATE COMPANY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

General Offices: Frick Building, Pittsburgh, Pa.

DISTRICT SALES OFFICES

Chicago Cincinnati Denver Detroit New Orleans New York Philadelphia Pittsburgh St. Louis
Export Distributors: UNITED STATES STEEL PRODUCTS COMPANY, New York City

Pacific Coast Distributors: COLUMBIA STEEL COMPANY, San Francisco, Los Angeles, Salt Lake City, Phoenix, Portland, Seattle, Honolulu



(Printed in U. S. A.)



FROM beginning to end, the manufacture of high grade—

AMERICAN Steel Sheets

is characterized by the use of correct materials, properly processed by modern methods and experienced craftsmen, under skilled technical supervision.

AMERICAN Products are supplied in Black and Galvanized Sheets, Formed Roofing and Siding Products, Special Sheets, Tin and Terne Plates for all known purposes. When maximum rust-resistance is an important factor, use KEYSTONE Copper Steel. This copper-steel alloy is unexcelled for Roofing Products and all exposed sheet metal work.

AMERICAN Sheet and Tin Mill Products have back of them a service and reputation for trustworthiness known to all buyers and users of sheet metal. Our able organization is lending every effort to serve consumers with products which have quality well wrought in, and conscientiously maintained.

Sheet Metal for Building Construction

IN offering this book BETTER BUILDINGS we realize that at best it can be but suggestive. As soon as the wide awake builder discovers the possibilities of the materials described herein, he will at once see constructions and applications as adapted to his requirements, much more varied than can be suggested within the limitations of these pages.

The Formed Roofing and Siding Materials of this Company are manufactured with particular respect as to *quality*. Modern mill equipment, good materials, skilled labor and rigid inspection mark the manufacture of these, as well as of the other Sheet and Tin Mill Products made by this Company. Our brands on such products are an assurance to purchasers that the goods are all they are represented to be, since they are everywhere recognized as *the standards* of the world.

THE "AMERICAN" BRANDS

APOLLO BEST BLOOM

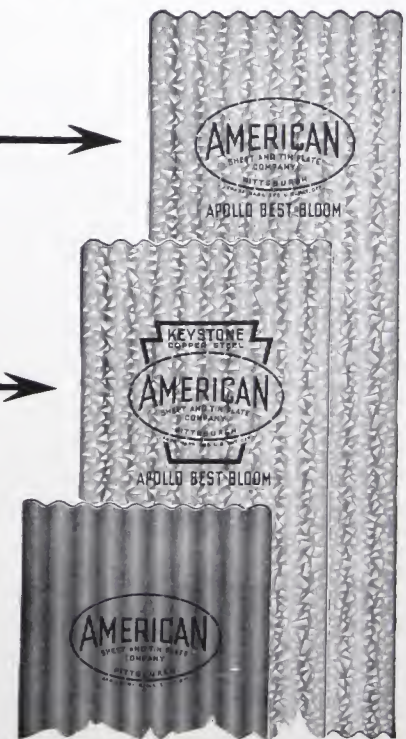
is branded on all Galvanized patterns. It indicates that these products were formed from the well known APOLLO Best Bloom Galvanized Sheets. The illustration opposite shows the brand with APOLLO BEST BLOOM beneath it, but remember—these products can also be supplied from galvanized sheets made with a Copper Steel base as noted below.

APOLLO-KEYSTONE

is the designation used for APOLLO BEST BLOOM Galvanized Roofing and Siding Products which possess an *added* degree of permanence secured by using KEYSTONE Copper Steel for the base sheet. APOLLO-KEYSTONE Copper Steel Galvanized Sheets are the highest quality and most rust-resistant sheets manufactured, and are unequalled for Roofing, Siding, Spouting, Silos, Culverts, Tanks, and all forms of exposed sheet metal work. The increase in cost for KEYSTONE Copper Steel is but a slight advance over the price of steel of regular analysis. Look for the KEYSTONE placed back of the Company brand—it indicates that Copper Steel is used. This material was awarded the grand Prize at the San Francisco Exposition for *general excellence* and *greatest merit*—a recognition of superiority. We shall be pleased to send upon request, literature descriptive of KEYSTONE Copper Steel and showing the results of various actual weather tests.

AMERICAN

is branded on all our Painted Roofing and Siding Products as indicated.



AMERICAN "Seal of Quality" HEAVY-COATED Galvanized

is manufactured in Corrugated and V-Crimped patterns to meet the demand for heavy coated long life roofing and siding sheets. Look for the "Seal of Quality" brand in addition to this Company's regular APOLLO BEST BLOOM trade-mark.



Leading dealers handle AMERICAN products, or can procure them for you. Look for the brands.

Formed Metal Roofing and Siding Materials



MODERN progress demands more and better buildings. As good timber becomes scarce and masonry more expensive, naturally the investigative mind is looking for a better and more economical building material that not only will give the maximum of protection at minimum cost, but also will carry with it those additional features desired in better buildings. This has led to the introduction of Metal Roofing and Siding Products as high grade building materials worthy of the most favorable consideration. The era of iron and steel construction is just at its beginning, and the possibilities of sheet metals have never yet been fully realized. Formed Metal Roofings and Sidings are an ideal material for most classes of buildings, as they offer so many advantages that the careful builder and owner of buildings cannot afford to overlook them. We suggest but a few of the more prominent features of these products:

GOOD PROTECTION AND SERVICE.—These are the first and essential requirements of a roofing or siding material. Metal sheets have given such abundant proof of their ability to render good and lasting service that it is entirely unnecessary to dwell at length upon these particular points of merit. Instances are numerous where metal roofings have given from thirty to forty years of good protection, and have given value received many times over. One thing is important. Start your roof right by using a product of known value and worth, and also of sufficient weight to insure long life. Satisfactory results are then sure to follow.

FIRE AND LIGHTNING PROOF.—These are features of decided value to all owners of buildings in rural districts or communities removed from fire protection. No material can equal metal sheets for such purposes. We know of no instance where serious damage has resulted from lightning where buildings have been covered by metal roofs. The danger from sparks and falling embers is greatly lessened or eliminated by the use of metal roofings and sidings. Their use is strongly advocated by underwriters, and buildings so covered will always secure the lowest rate of insurance.

ADAPTABILITY.—The varied forms of our Roofing and Siding Materials make it possible to construct practically any type of building, with roof construction from nearly flat to that of the steepest pitch. The metal roof can be readily applied to what would otherwise be a very difficult roofing proposition.

NEAT APPEARANCE.—This feature is receiving more attention from owners of property. A group of metal roofs on a farm or country estate adds much to the appearance of the property and is quite in contrast to a group of streaked, vari-colored and unsightly roofs. Many owners of property prefer metal roofs for this feature alone.

WEATHER RESISTING.—Formed Roofing and Siding Materials are not injured by sudden changes of weather or temperature. Snow, wind, hail, ice, etc., which would work havoc with many other kinds of roofing, cannot seriously affect these metal roofings. Corrugated sheets do not suffer from expansion or contraction and are therefore not affected by sudden changes in weather, and when properly applied do not buckle nor rattle.

REASONABLE COST.—Metal roofings are cheaper than wood shingles, that is, good wood shingles; and while costing practically the same as felt or tar roofings, are much superior to either. We call attention to the fact that it is false economy to buy roofing sheets in too light a gauge. Get your roofing heavy enough to insure long service. You exercise this precaution in purchasing lumber; you should do the same in sheet metal.

FULL WEIGHT SHEETS.—This is an important feature and a decided advantage to every user of roofings. Unscrupulous manufacturers have put on the market products that are lighter

than standard weights. The results have been unsatisfactory service and criticisms of metal roofings and sidings. This is unfair, since there is a fixed standard of weights. We publish it on page 26 of this book. See that your sheets weigh up to it. The only variation permissible is the very slight variation above or below, unavoidable in the best of mill practice. Instances are frequent where roofings have been purchased which varied one or two gauges from the standard the purchaser was led to believe he was receiving. The products of this Company are strictly standard and full weight per square and are sold by weight.

CLEAN AND SANITARY.—This is an important feature where water from roofs is run into cisterns. Metal roofs have a smooth surface, and the wind keeps them clean and free from dirt, leaving nothing to wash into the cistern. Users of cistern water are pleased to find how much cleaner the water is than that from shingle, gravel or composition roofs which are retentive of dirt and foreign matter.

STRENGTH AND RIGIDITY.—The use of corrugated patterns imparts additional strength and rigidity without the use of closely laid sheathing, thus considerably reducing the cost of construction and at the same time insuring a roof fully as strong as many other types of roofs requiring solid sheathing. This is true to a greater or less extent in the use of flat sheets and other formed patterns. The light weight of metal roofings renders unnecessary the heavy structural work required to carry a roof as heavy as slate, tile and other heavier materials.

EASE OF APPLICATION.—These formed sheets are easy to apply and do not necessarily require the employment of experienced labor. The only tools necessary are a hammer or hatchet, and a pair of tinner's snips, in case you should desire to cut some of the sheets. On pages 19 to 21, of this book we give full directions as to measurements and methods of application for the various patterns.

OTHER ADVANTAGES.—In addition to the foregoing, these products possess many other desirable features, in that they do not crack, warp, split, run, blow off, clog gutters, nor develop any of the expensive and annoying traits common to many other roofings. We believe that iron and steel sheets are the most practical and satisfactory roofing and siding material that can be obtained for all classes of buildings to which they are applicable. On pages 23 to 25 we show these various products, together with brands and data for the guidance of those interested in securing the highest grade of Formed Metal Roofings and Sidings.

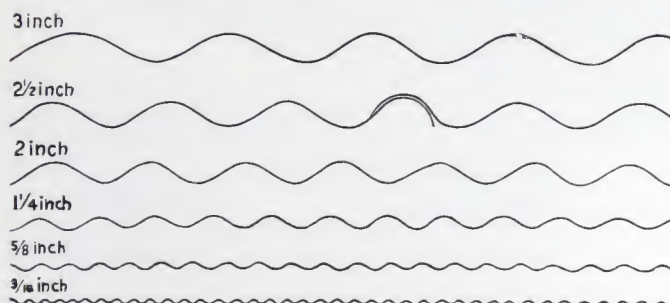
HOW TO SECURE "APOLLO" PRODUCTS.—If your Hardware or Builders' Supply Dealer does not carry "APOLLO", "APOLLO-KEystone" or "AMERICAN" brands, he can easily secure them for you from his jobber. If for any reason he is unable to secure them, or attempts to substitute some other brand, then write direct to our general office or to our nearest district sales office. We will see that your requirements are supplied.

Important to Buyers and Users of Formed Products

CORRUGATED SHEETS

are the strongest and most rigid of all forms of Sheet Metal Roofing or Siding. Sheathing is not essential, and as Corrugated Sheets are easily and rapidly applied, this form is more generally used than any other pattern.

The following are standard widths of corrugations: $\frac{3}{16}$ inch, $\frac{5}{8}$ inch, full $1\frac{1}{4}$, 2, full $2\frac{1}{2}$, 3 and 5 inches, in either Galvanized, Black or Painted,



and in standard lengths of 5, 6, 7, 8, 9 and 10 feet, and with a maximum length of 12 feet. $\frac{3}{16}$ inch, Crimped crosswise, has a maximum width of 30 inches. All our Corrugated Sheets have an approximate covering width of 24 inches. Pressed Standing Seam, and V-Crimped Roofings are made in the same lengths as the Corrugated patterns. Roll Roofings are packed in rolls containing 50 or 100 lineal feet and when applied will cover 100 or 200 square feet of surface. Brick and Stone Sidings are made in one size only, sheets 28x60 inches. Beaded Ceiling or Siding and Weatherboard Siding are made in same length sheets as the Corrugated. Since the Corrugated pattern is perhaps more popular than any other, we shall give the matter of its application more general consideration.

A SQUARE OF ROOFING

consists of one hundred (100) square feet, which means sheets enough to make a total of one hundred (100) square feet, or a space ten feet square, not including the laps as mentioned under the head "Directions for Measurements." 12 to 18% on Siding and 20 to 25% on Roofing should usually be added to your surface measurements to cover laps.

SERVICE TESTS

The only reasonable and safe test of a roofing or siding material is the test of time and service. These products have been on the market long enough to demonstrate their value. However, much has been said of certain metal roofings and sidings being "rust proof," "non-corrosive," etc. These are misleading terms when applied to such products. Any exposed iron or steel sheet will rust or corrode unless coated, galvanized or painted. This is a plain statement of fact. The best and safest guarantee for the customer is to buy a product of known value. The "acid test," another misleading term when applied to service, should not be considered in connection with roofings and sidings. Dipping a sheet in a solution

of sulphuric acid does not indicate how long it will last on a building; time only will prove that. Demonstrations have shown where sheets giving forty years' service have been destroyed in a few hours by a solution of sulphuric acid. Well informed buyers and users of metal roofs discredit the use of acid as a test of their ability to last. It has been proved positively that a Copper Steel alloy possesses greatest resistance to rust and corrosion in actual service.

GALVANIZING

The galvanizing of sheets is effected by passing the black or uncoated sheets, after they have been thoroughly cleaned and prepared, through pure molten zinc. By this process the surface is uniformly covered by an adherent coating of zinc which excludes the oxygen and moisture of the atmosphere and prevents corrosion and rust. Galvanizing is the best and most satisfactory method ever discovered to protect metal sheets from corrosion.

PAINTING

In the event the customer does not wish to purchase galvanized sheets, the same results can be obtained by painting. The sheets of our "AMERICAN" brand are mechanically painted at our mills if desired, but should be repainted after placing on the roof. We advise only the best linseed oil and oxide paint, not only for roofs but for all sheet metal work. We believe that many of the objections lodged against sheet metal work, because of its rusting, belong rightfully to the poor quality of paint used. It is economy to use only the best grade of paint. The objection raised against a metal roof by many prepared roofing manufacturers—"it has to be painted," is altogether misleading. Of course it has to be painted, just the same as your house, wood work, implements and automobile. The saving in insurance alone will often cover this very nominal expense, while your property is improved greatly in appearance and is enhanced in value by being covered with these high grade metal roofing products. (See specific painting article on page 29.)

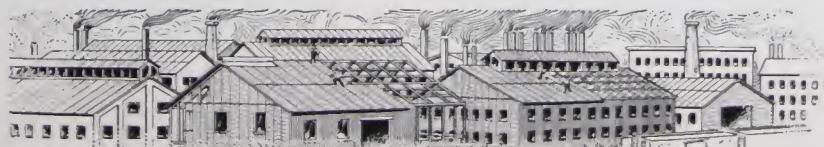
BRANDS

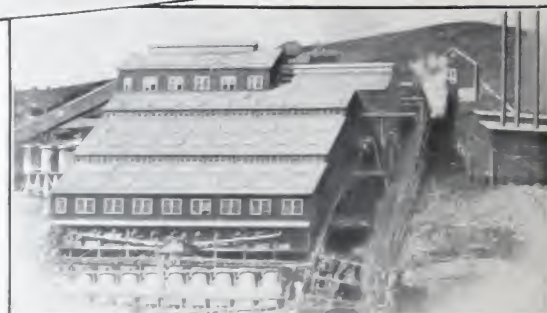
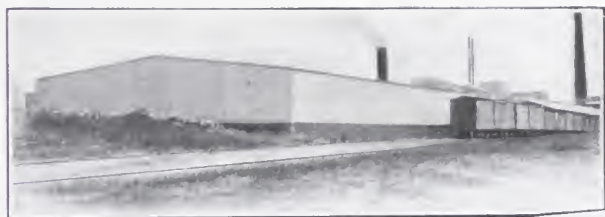
These materials are packed in bundles of about ten to twelve sheets each, the top sheet of which is stenciled with the brand. If the sheets are galvanized, the stencil is "APOLLO BEST BLOOM" as noted on page 3; if a copper steel base sheet is used the brand is "APOLLO-KEYSTONE"; and if the sheets are plain or painted, the stencil will be "AMERICAN." Inspect every bundle to see that the brand appears on each, so that your product may be uniform throughout. We also manufacture AMERICAN "Seal of Quality" HEAVY-COATED Galvanized, specially produced for Roofing and Siding.

GAUGES

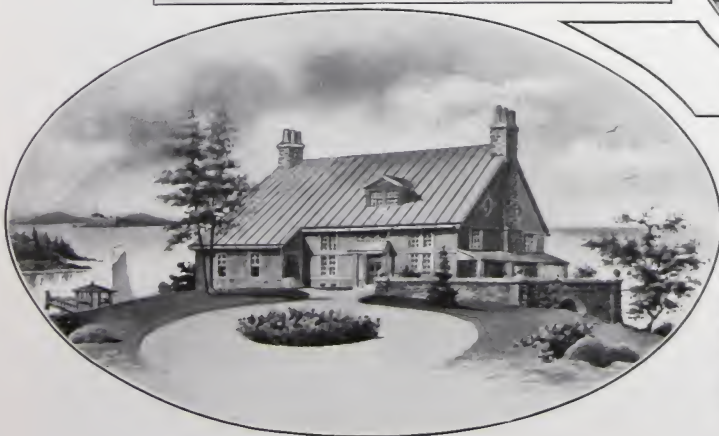
These Formed Roofing and Siding Products are made in several gauges or thicknesses, as is clearly indicated on the tables of weights shown on page 26. The lower the gauge number the heavier is the weight. For example, 26 gauge is heavier than 28 gauge. In purchasing roofing and siding, we advocate the securing of a gauge of sufficient weight to give the best results. In past years roofing lighter than 26 gauge was not even considered, and the heavier gauges were quite generally used. This explains the excellent results secured. We also call attention to the fact previously stated that many unscrupulous manufacturers are placing on the market products which are not true to gauge and are not full weight.

Why Build to Burn? — Use Metal Roofing and Siding

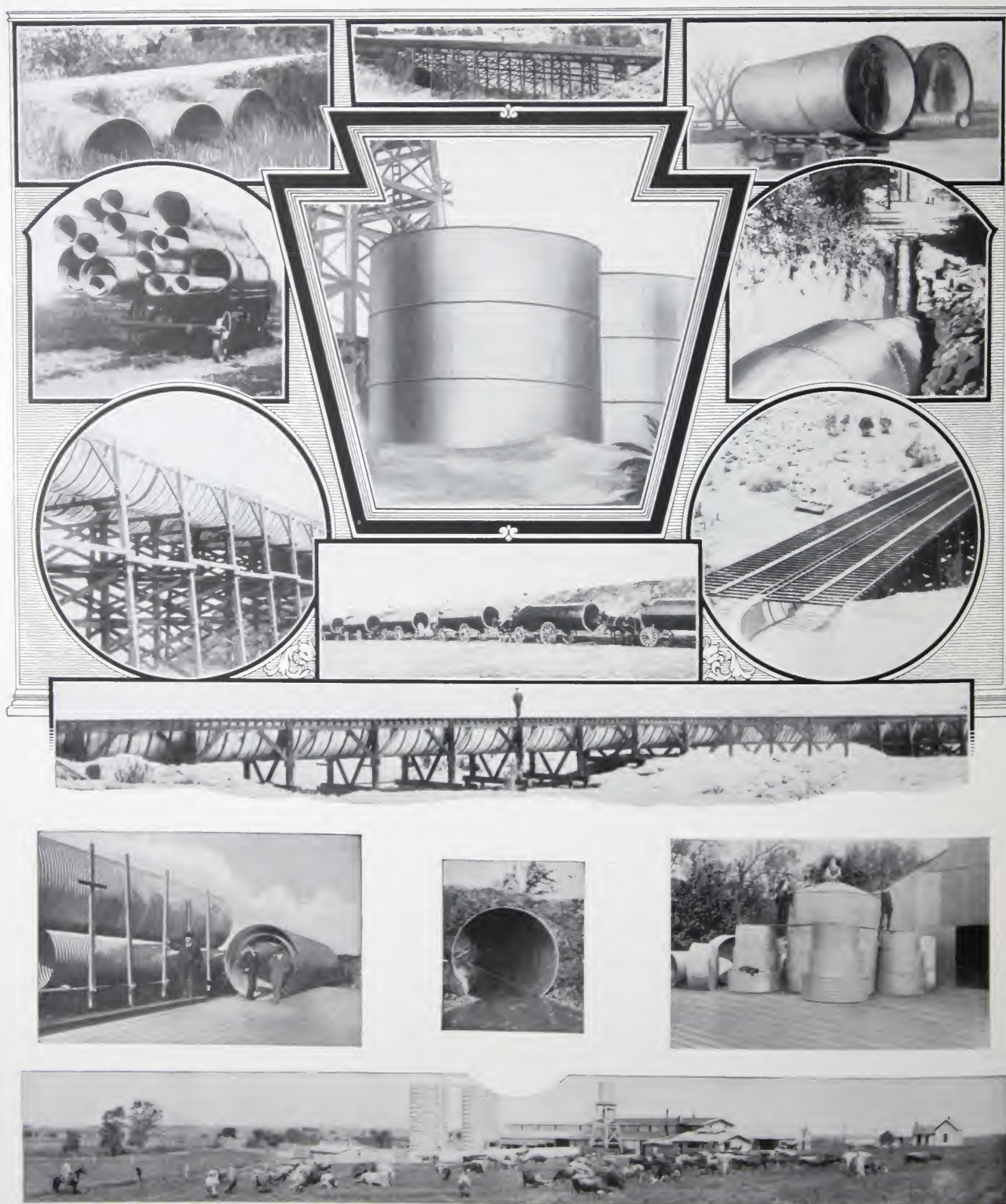




Corrugated and Formed Products as applied to manufacturing plants, factories, grain elevators, packing houses, warehouses, railway sheds and boat houses. (See pages 23 to 25)

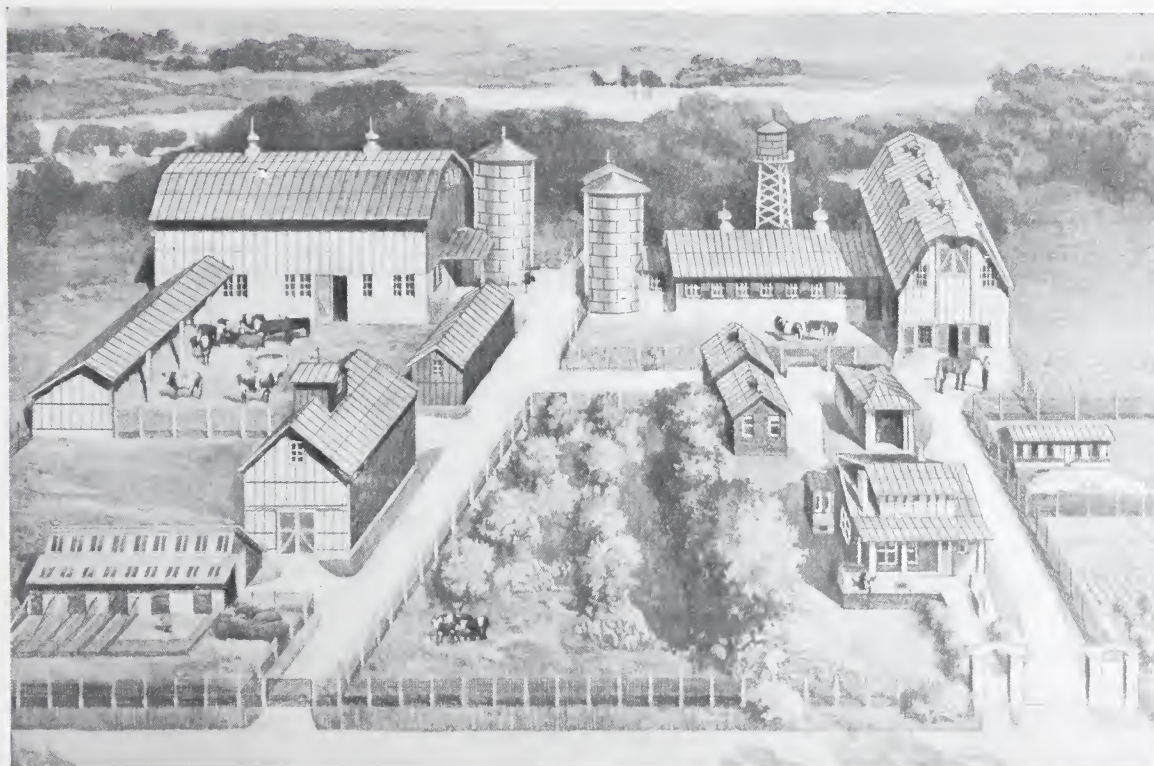


Plain Roofings and Terne Plates are specially adapted to residences, country homes, churches, bungalows, cottages and summer homes. (See pages 23 to 27)



Apollo-Keystone Copper Steel Galvanized Sheets are unequalled for Culverts, Silos, Tanks, Flumes and similar uses. These sheets insure greatest durability and rust-resistance.

Model Farm Buildings and Arrangement



This set of farm buildings is right from every point of view—convenience of layout as a whole; practical efficiency of each building considered separately; buildings good looking, yet economical to put up; every approved modern idea included.

Beginning at the attractive front entrance we have a commodious nine-room farm house of the latest bungalow type and fitted with all modern conveniences. Directly back of it on the driveway is the combined garage and farm power house where the water supply and electric lighting outfits are installed. Just a step further on is the horse barn with one-story dairy stable addition, all as recommended by the foremost dairymen and builders. The horse stable part has a high gambrel roof, affording immense hay storage. The cattle are fed from the two big silos at the end of the cow stable. Stepping across the lane we enter the beef cattle barn, a gambrel roof, concrete basement barn providing warm and sanitary stock pens on the ground floor and big storage space above. A stock shed addition shelters the cattle yard along the west. Next we come to the pig yard with its snug winter hog house of the approved saw-tooth roof type. Just

back of the hog house and equally convenient to it and to the cattle lot stands the big corn crib and granary. Note that this is a two-story building with built-in-place cup elevator for handling corn and other grain in the easiest way. The implement or farm machinery shed is a long low building at the intersection of the cross driveway and the farm lane, a most convenient location. On the driveway near the dairy stable and also convenient to the farm house and calf pasture, stands the combined dairy house and ice house. Last, but not least, the poultry house stands just over the fence by the house back door.

The grouping of these farm buildings is ideal. All of the farm chores are laid out in short circuits from one building to the next, saving thousands of steps. Every element in this group is a practical building of just moderate size, such as appeals to the average prosperous farmer of today.

The use of Formed Metal Roofing and Siding Products gives the best possible protection from fire and lightning, and insures durable, satisfactory buildings at reasonable cost.



Model Farm Buildings designed by the Radford Architectural Company, Chicago, to whom we are also indebted for many of the illustrations shown on the following pages.

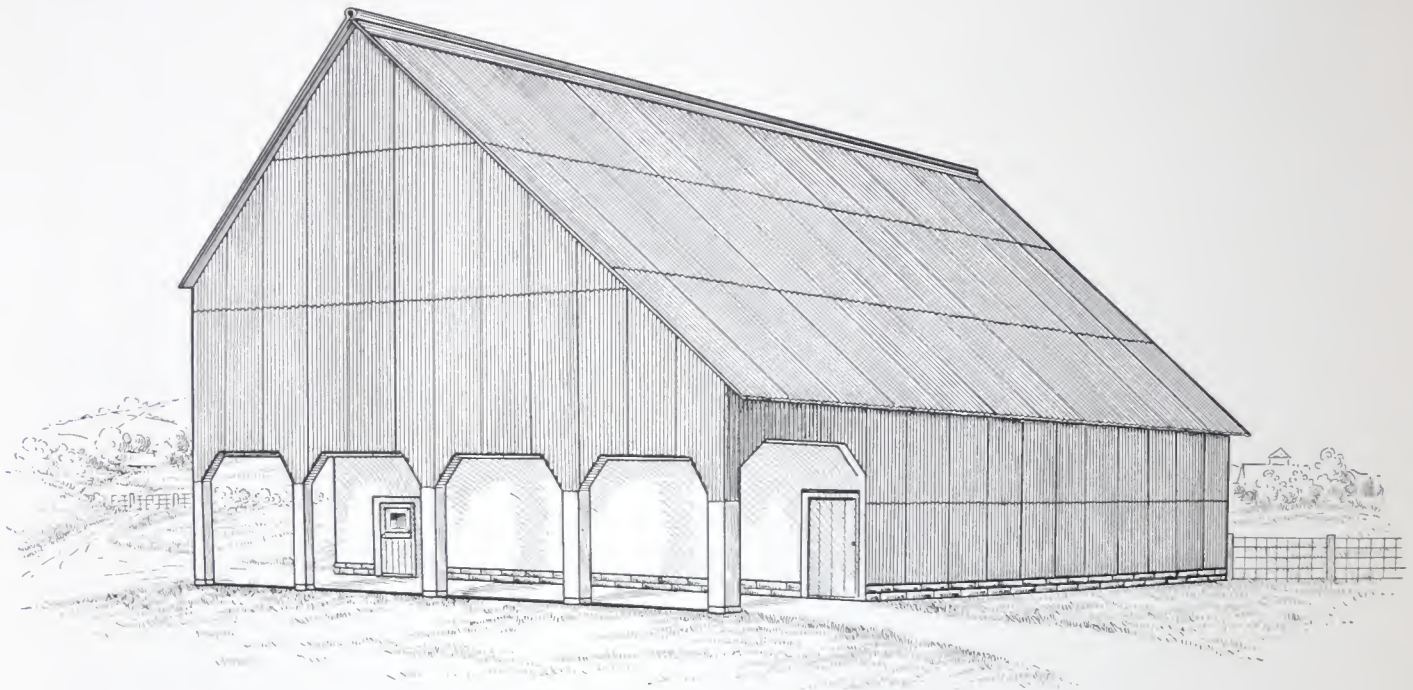


FIG. 1-a

Farm Building covered with Corrugated Roofing and Siding. (See pages 23 to 25)

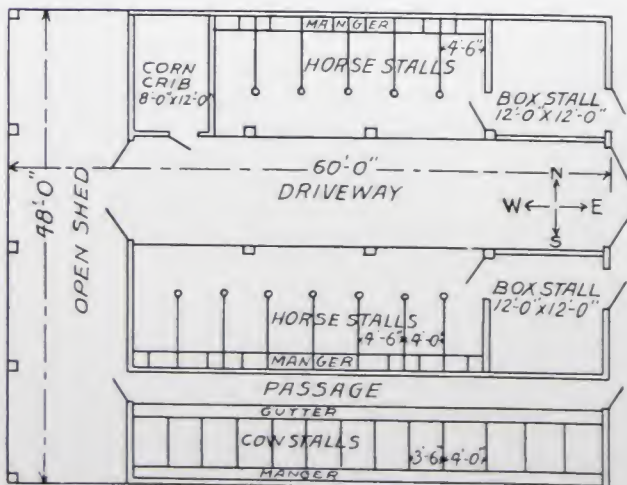


FIG. 1-b

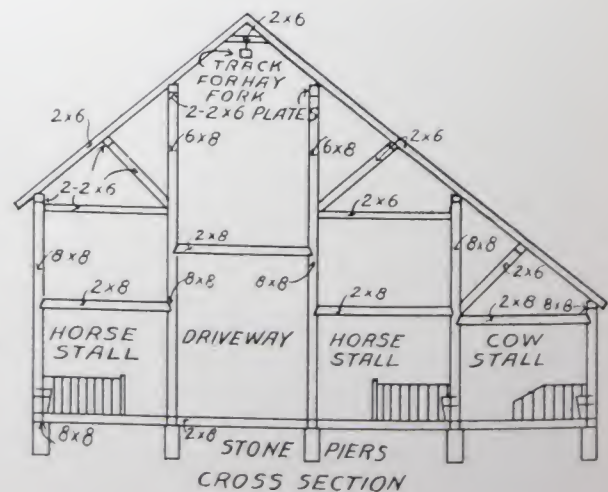


FIG. 1-c

Floor Plan and Cross Section of Barn shown above.



FIG. 2-a

Barn covered with V-Crimped Roofing and Rock Faced Stone and Weatherboard Siding. (See pages 23 to 25)



FIG. 2-b

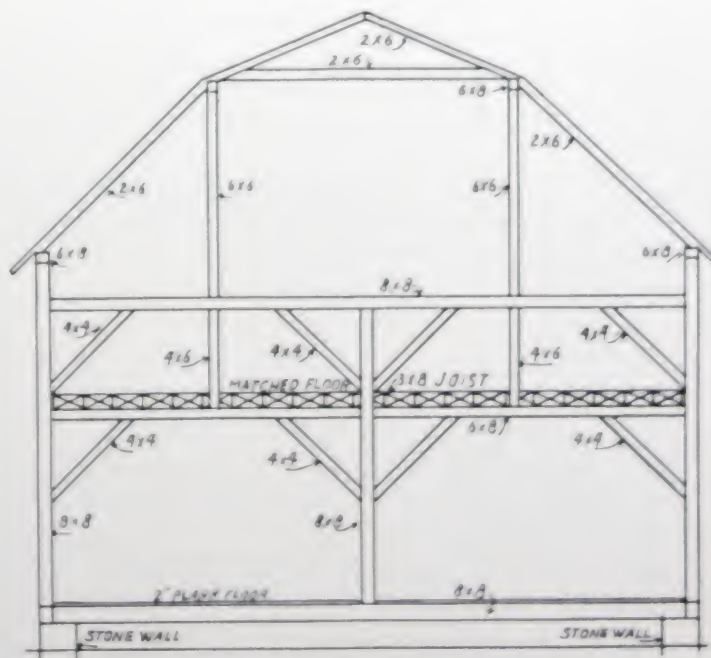


FIG. 2-c

Floor Plan and Cross Section of Barn shown above.

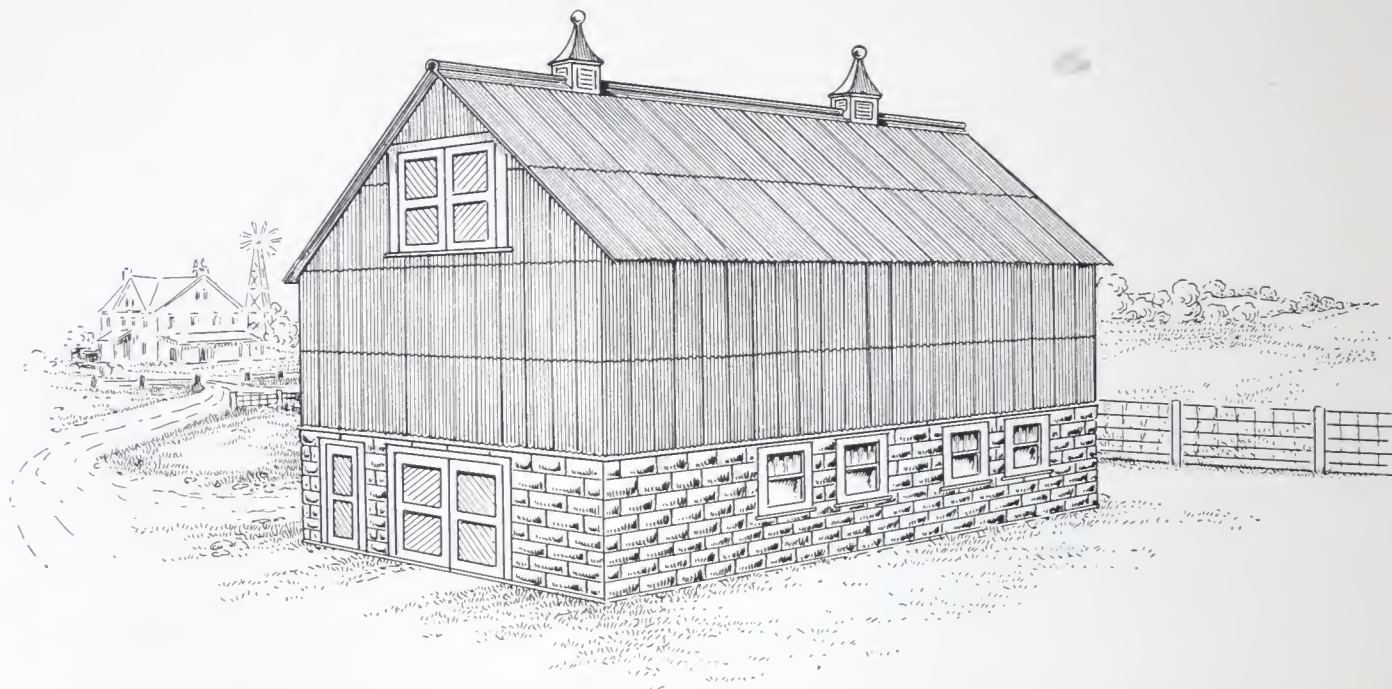


FIG. 3-a

Barn covered with Corrugated Sheets and Rock Face Stone Siding. (See pages 23 to 25)

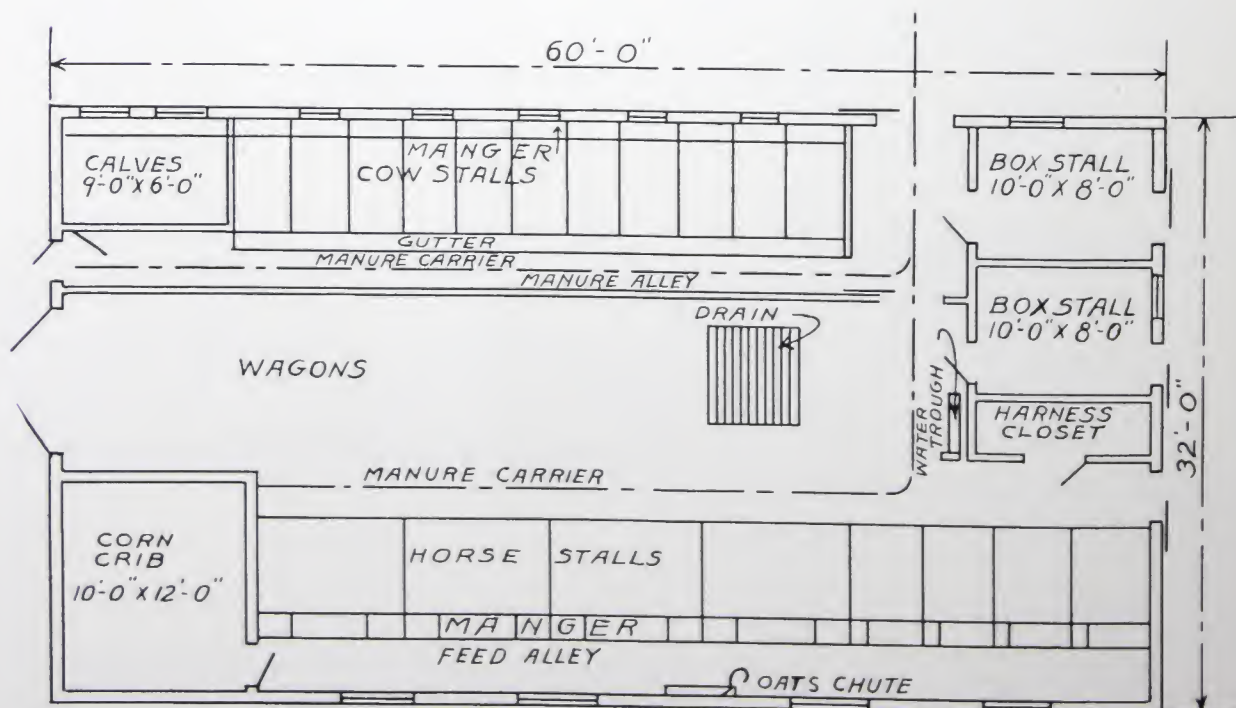


FIG. 3-b

Floor Plan of Barn shown above.



FIG. 4-a

Barn covered with Pressed Standing Seam Roofing and Weatherboard Siding. (See pages 23 to 25)

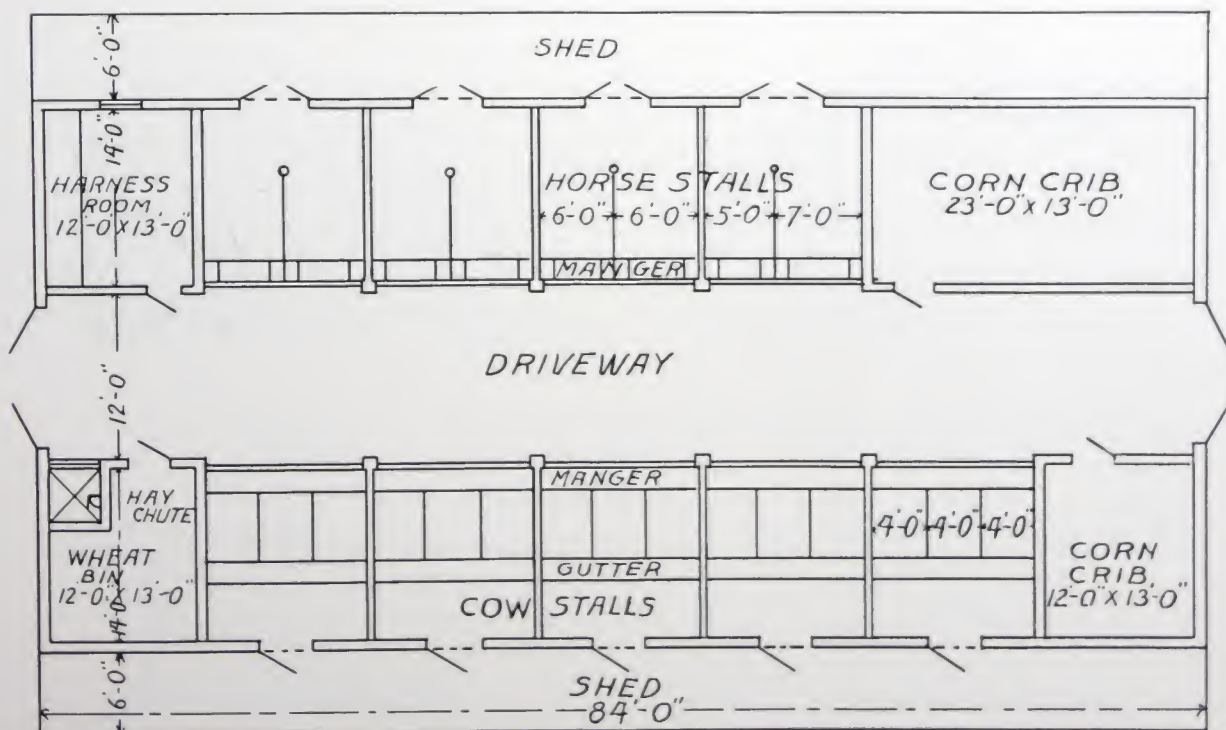


FIG. 4-b

Cut showing Floor Plan of Barn shown above.

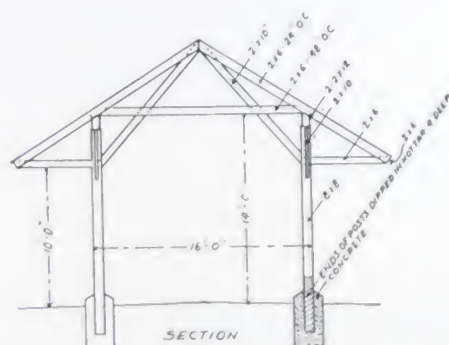
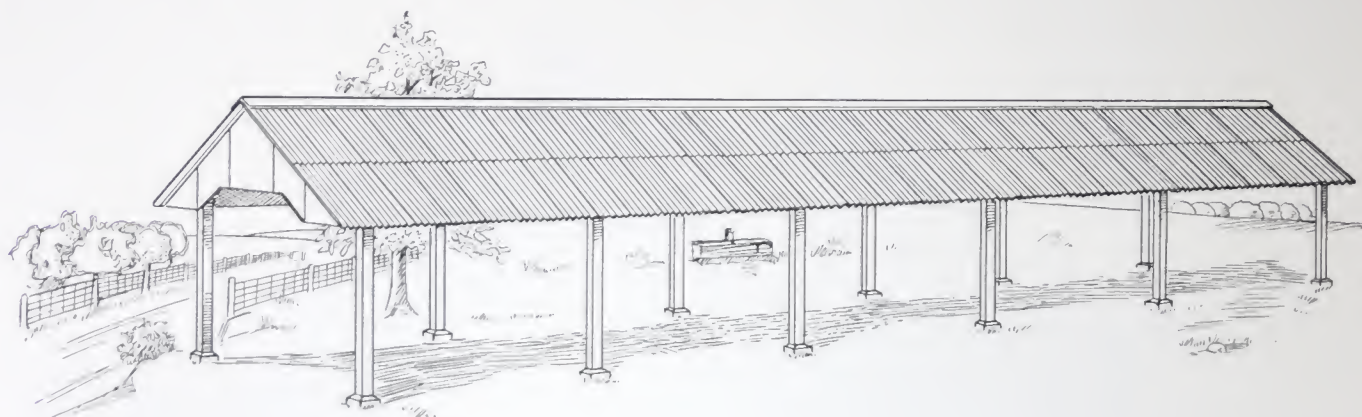


FIG. 5—(with End Sections)
Long Shelter Shed Covered with
Corrugated Sheets.

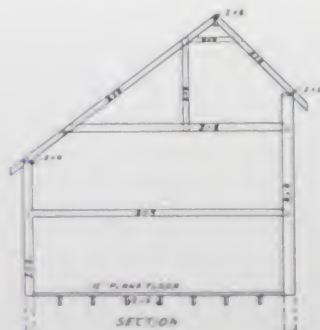
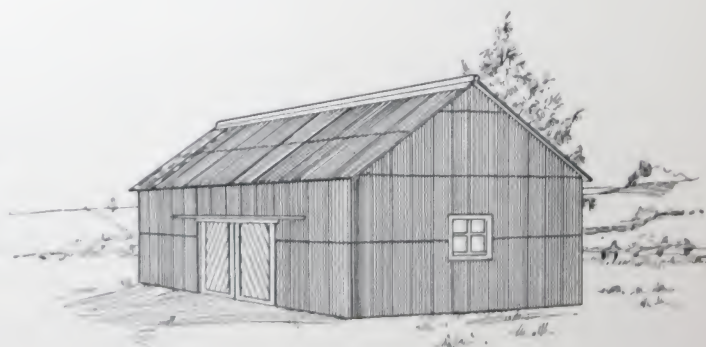
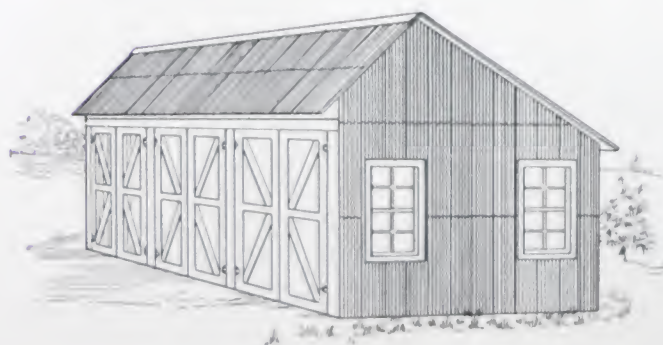
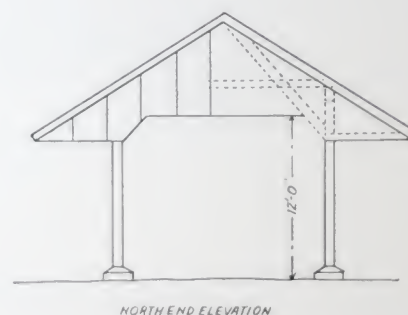


FIG. 6—(with Cross Section)
Implement Shed covered with Corrugated Sheets.

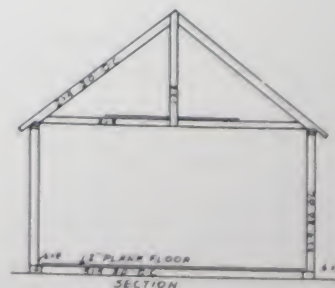


FIG. 7—(with Cross Section)
Small Wagon Shed covered with Corrugated Sheets.

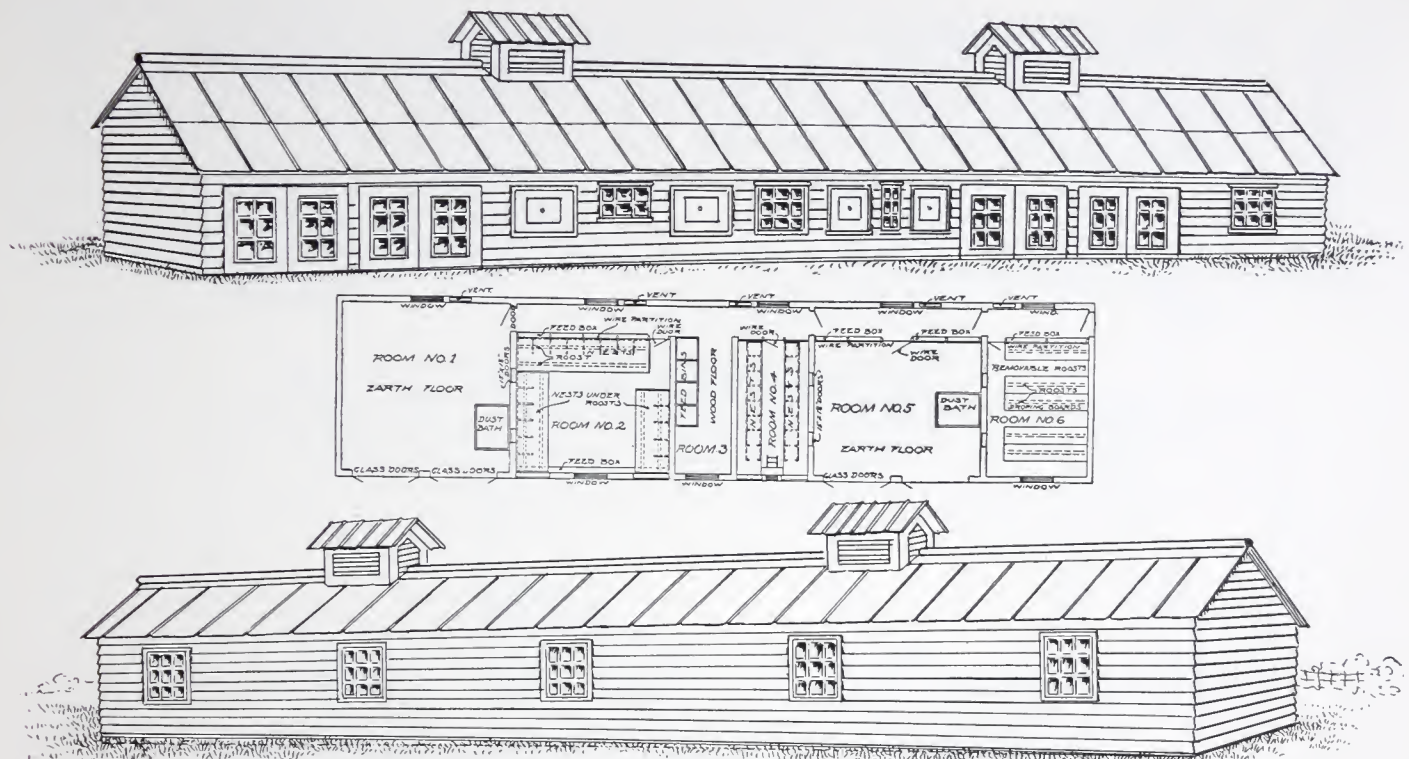


FIG. 8—(with Floor Plan)

Large Poultry House covered with V-Crimped Roofing and Weatherboard Siding. (See pages 23 to 25.) The colder climates will require poultry houses to be lined, in addition to the metal covering, to secure warmth.

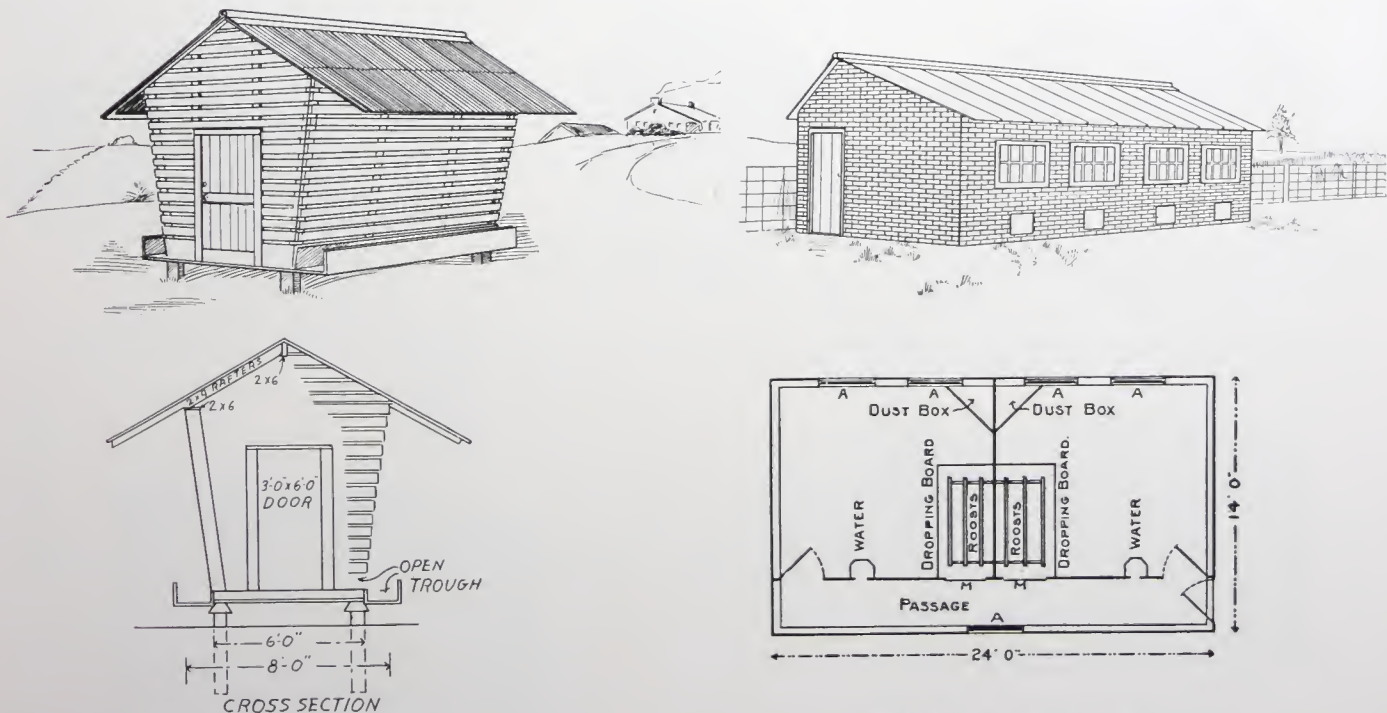


FIG. 9—(with End Elevation)
Corn Crib covered with Corrugated Sheets.

FIG. 10—(with Floor Plan)
Poultry House covered with V-Crimped Roofing and Plain Brick Siding.

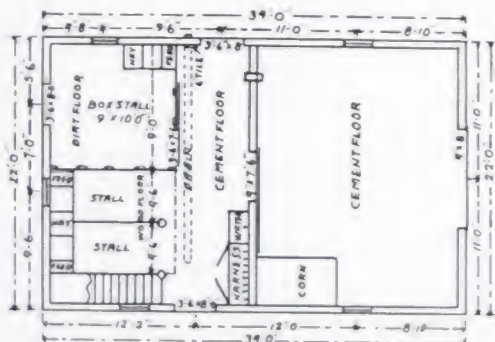
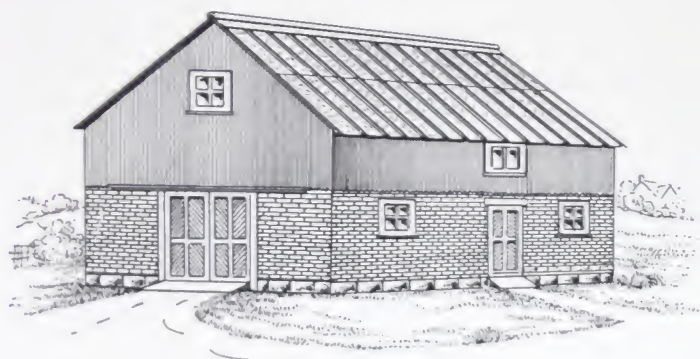


FIG. 11—(with Floor Plan)

Small Barn covered with V-Crimped Roofing,
Corrugated and Plain Brick Siding.

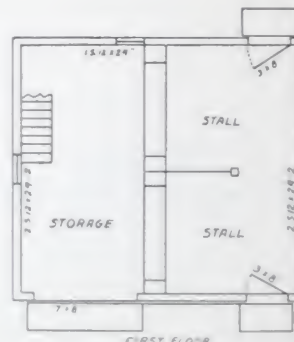
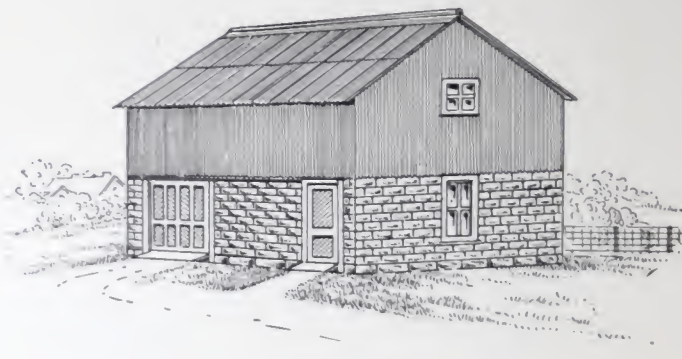


FIG. 12—(with Floor Plan)

Small Barn covered with Corrugated Sheets
and Rock Face Stone Siding.



FIG. 13—Corrugated Hay Shed.



FIG. 14—Corrugated Pump House.

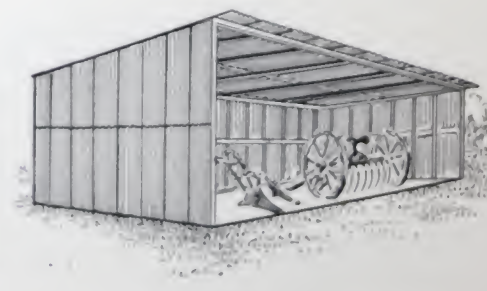


FIG. 15—Corrugated Implement Shed.

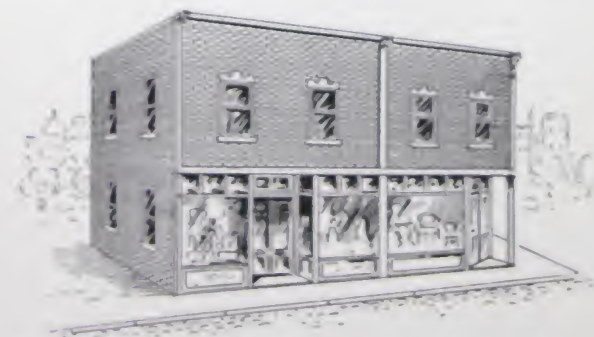


FIG. 16—Small Store Building covered with Pressed Brick Siding.

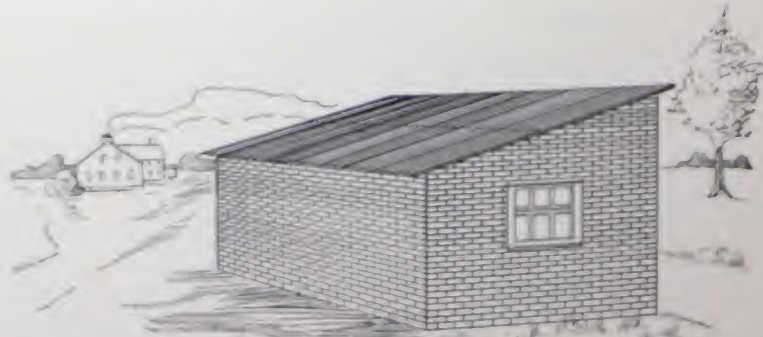
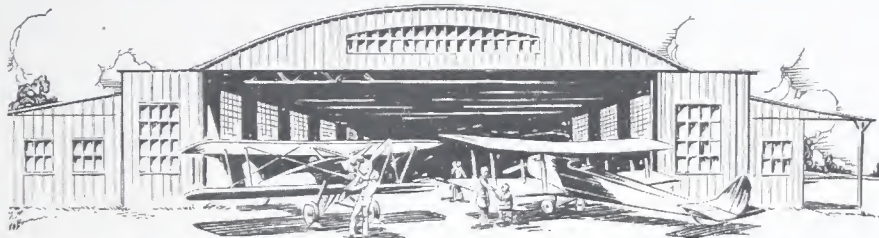


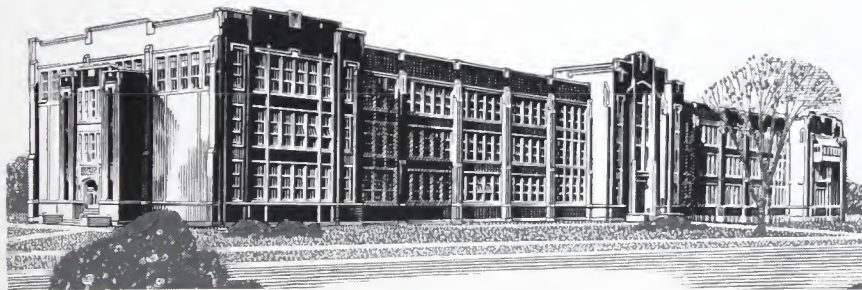
FIG. 17—Storage Shed.



Keystone Copper Steel Sheets are unexcelled for all forms of Sheet Metal Work.



Steel Sheets are adapted for Airport Buildings, Hangars, Shops and Sheds.



High School Building. Keystone Quality Sheets used for the sheet metal construction.



FIG. 18—Showing application of Beaded Ceiling.

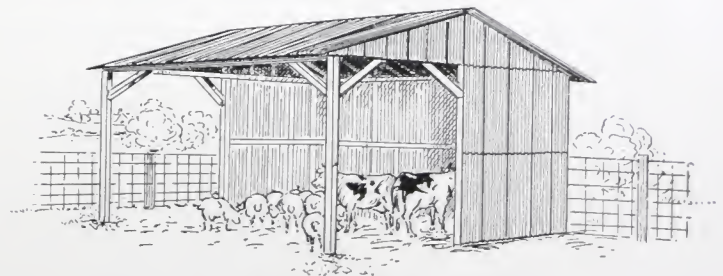


FIG. 19—Stock Shelter.

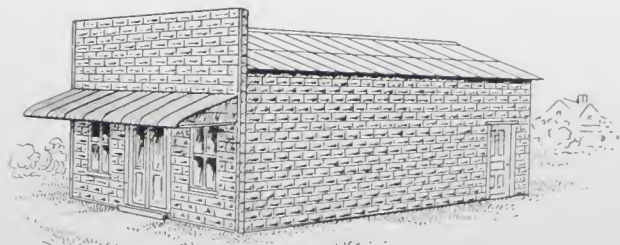


FIG. 20—Small Market covered with Rock Face Stone Siding.

For descriptions of Corrugated and Formed Roofing and Siding Products see pages 23 to 25.

Ventilator
Ridge Roll
and Corrugated Roof
formed of
Apollo Best
Bloom Galv-
anized Sheets
or "Apollo Key
Stone Copper
Steel."
The corrugated
Roof may also be
formed of
American
Roofing
Sheets

VENTILATOR TYPE
GENERALIZED

Corrugated Sheet
Roofing and Siding

Steel Truss

Channel Purlins

DETAIL OF STEEL BUILDING SHOWING
APPLICATION OF CORRUGATED SHEETS

Outside of Building

SIDE LAP OF
ROOF SHEETS

Outside of Building

SIDE LAP OF
SIDE SHEETS

STEEL
CLIP

A

B

WOOD
NAILING
STRIP

C

D

METHODS OF APPLYING CORRUGATED
ROOFING TO STEEL PURLINS

3/16" Rd. Slove Bolt
Lead Washer

Decking Fastened
to Purlins With Clips
or Clinch Rivets

Typical Section Thru Roof

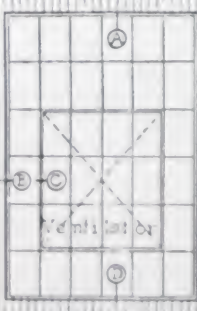
Corrugated Roofing
Eave Flashing
Siding

Purlins About
5'-9" Centers

Insulating Material
Corrugated
Steel Decking

Method of Laying Corrugated Steel Roof with
Corrugated Steel Decking and Insulation

Concrete
Foundation



ELEVATION



SECTION A

SECTION D



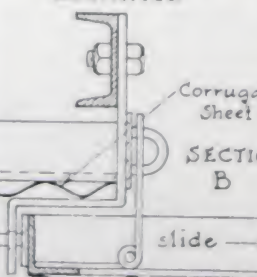
SECTION B

SECTION C

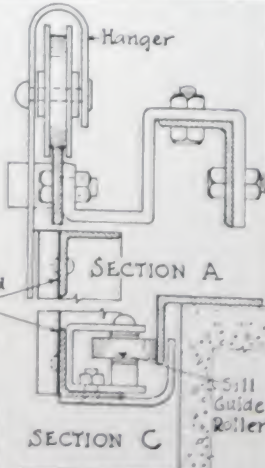
DETAILS OF STEEL SASH



ELEVATION



SECTION B



SECTION A

SECTION C

DETAILS OF CORRUGATED METAL DOOR

5 INCH

3 INCH

2 1/2 INCH

2 INCH

1 1/4 INCH

5/8 INCH

3/16 INCH

DETAILS SHOWING
STANDARD CORRUGATIONS

ADAPTED FROM
SWEET'S CATALOGUE
SERVICE, INC.

METHOD OF APPLYING APOLLO KEYSTONE COPPER STEEL,
& APOLLO BEST BLOOM CORRUGATED GALVANIZED SHEETS

SCALE 3' DRWG
EQUALS 1'-0"
DATE-JUL-20 4

Directions for Measurements and Methods of Application For Formed Roofing and Siding Products

DIRECTIONS FOR MEASUREMENTS

To find the quantity of roofing or siding required, multiply the length by the width of each space or surface to be covered. The result is surface measurement to which should be added sufficient to cover end and side laps. In gable measurement, multiply the width by the height and take one-half of the result which will give surface measurement, then add for the laps 12 to 18% for Siding, and 20 to 25% for Roofing. The following diagrams show methods for measurement.

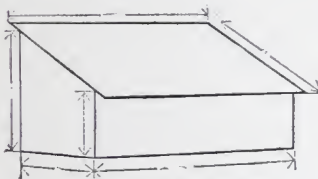


Fig. A—For Shed Roofs

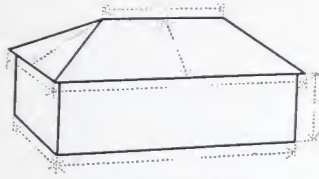


Fig. C—For Hip Roofs

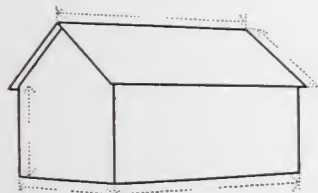


Fig. B—For Ridge Roofs

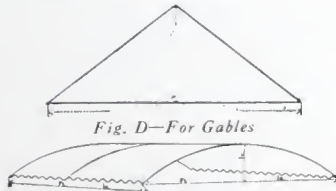


Fig. D—For Gables

Fig. E—For Curved Sheets for Ceiling

Allow for projections, if for Roofing. If for Ceiling, state exact distance between bottoms of fillets of "I" beams if of steel also lengths and number of spaces to be covered. For Curved Sheets, always state whether to be used for Roofing or Ceiling, taking measurements as indicated.

APPLICATION OF CORRUGATED SHEETS

FOR ROOFING—WOODEN FRAMING

When ready to begin laying Corrugated Roofing on a building, consider first from which direction your heaviest winds and rains usually come. If from the right, begin laying the Roofing at the left hand side. If from the left, begin at the right hand side. Lay the first sheet at the lower corner of your roof—either right or left side, as explained above—allowing one corrugation of the sheet to project over the roof boards at side, and also from 2 to 3 inches of the end of the sheet to project at the eaves. Keep the corrugations in straight lines up and down the roof to make a neat appearing and effective job.

First, hammer down the projecting corrugation at side, over the edge of the roof boards and nail it there securely in place. Then nail across the sheet through the tops of alternate corrugations close to the eave. It is unnecessary to drive nails through the body of the sheet, all nails being in the sides and ends of sheets. Lay the second sheet side by side with the first, lap it over the first sheet $1\frac{1}{2}$ corrugations, and then nail the two sheets together through this lap,



Fig. F

the nails being driven straight down through the tops of the corrugations and about 8 inches apart. Also, nail across the eave as on the first sheet, each alternate corrugation. The third sheet is laid exactly the same as the second, and the work is continued, sheet by sheet, until you complete the first row across the full length of the roof. Then begin on the second row of sheets and apply them as in the first row, allowing the $1\frac{1}{2}$ corrugation side lap and 3 inches or more lap down over the first row of sheets, driving the nails through both sheets, at end laps as well as side laps. Complete this

row across the roof before beginning with the third row, and continue until the roof is completed.

Always drive the nails vertically and through the tops of corrugations as described; do not drive nails through other than edge corrugations—it is unnecessary.

We would urge particular attention to keeping straight lines throughout. It would be a good plan to strike chalk lines across the roof as well as up and down, so that you will be sure to have the corrugated sheets straight.

We recommend that while the roofing is being put on, you use a continuous string of thick metallic paint, paste or cement—made by mixing dry metallic paint with linseed oil—between laps of sheets, to aid in making them water-tight. Where this plan is thoroughly executed, there cannot be the slightest leakage.

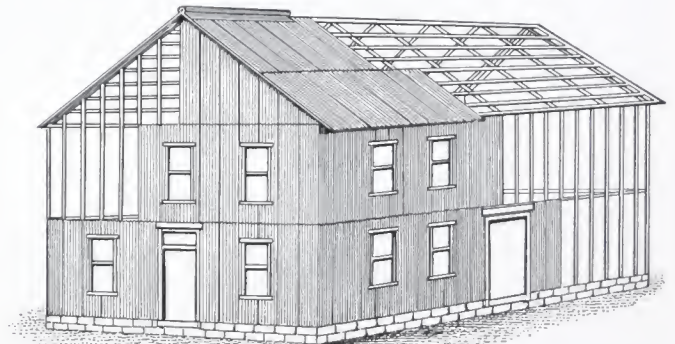


Fig. G

Corrugated sheets of light gauges should not be applied directly to rafters. It will be equally as cheap, and much more effective, to place purlins of 1x4 inch stuff, say 8 inches apart. In this case, the rafters can be at any distance your best judgment dictates, and need not be placed so accurately as would otherwise be necessary.

Where the heavy gauges of sheets are used, sheathing boards may be dispensed with, so far as providing support for the roofing is concerned, and purlins substituted, thus economizing in lumber. The maximum spacing of purlins would be for No. 24 gauge, two feet; No. 22, two to three feet; No. 20, three to four feet, and No. 18 or 16, four to six feet. With the lighter gauges No. 26 and No. 28 U. S. Standard Gauge, we consider it advisable to use close sheathing of common stock boards.

For steep roofs, a lap of three inches at the ends of sheets is ample. Where the pitch is less than three inches per foot, we recommend the use of our Standing Seam, or our Roll and Cap Roofing.

Where hot air, steam, or sulphurous fumes will come in contact with the under side of a roof, use a Felt Lining between the sheathing and the roofing.

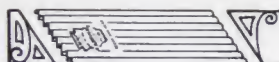
When two or more length sheets are used, place the shortest sheets nearest the ridge. Be careful to lay sheets so that the corrugations of each will be in line accurately from ridge to eaves. Repaint the top side of the roofing immediately after applying, or as soon thereafter as the weather will permit.

For Roofing the better practice is to lap the sheets one and one-half corrugation as indicated in Fig. F, nailing through top of corrugations.

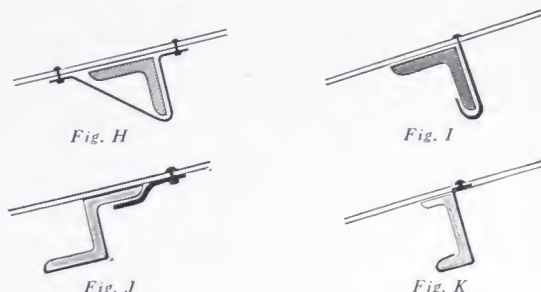
FOR ROOFING—METAL FRAMING

For Roofing or Siding, metal framing, the side laps should be riveted every twelve to eighteen inches, or closer, and end laps on every other corrugation.

One of the best methods for fastening the sheets to metal beams and purlins, is by passing a cleat of band iron $\frac{3}{4}$ or $\frac{1}{2}$ inch wide



around the purlins or beams, and rivet both ends to the sheet; by contracting or pressing this cleat toward web of beams or purlins, a tight and secure fastening is made which allows for contraction or expansion of the sheet.



The above illustrations show several methods for applying Corrugated Roofing to metal roof frame work. Fig. H shows strap iron cleat riveted at each end; Fig. I shows a long wire or clinch nail driven through the Corrugated Sheet and bent around the angle iron; Fig. J shows a cleat made from bar iron, riveted firmly to the Corrugated Roofing and binding against the flange of Z bar or angle iron; and Fig. K a strap iron cleat riveted at one end only, the other end clamping the flange of channel iron.

FOR SIDING—WOODEN FRAMING

Use either $2\frac{1}{2}$ inch, or $1\frac{1}{4}$ inch wide corrugations; the first is preferable. Allow for 3 or 4 inches lap at ends of sheets. Patent Edge $2\frac{1}{2}$ inch Corrugated presents a paneled appearance.

Begin at the bottom, running first row across side, lapping one corrugation at side of each sheet. Be very careful to keep the edge corrugations plumb, and in line. Put up the second row in the same manner, lapping ends of sheets down over the top of the first row.

Where used without sheathing boards, the studding should be framed to measure from center to center, of the exact covering width of sheets; or if preferred, put the studding three to four feet apart and nail the sheets to batten strips, placing these strips, say, two feet apart and across the studding horizontally.

When studding is used, 2 by 4 inch lumber will answer usually. Nail siding through the tops of corrugations.

Using heavy corrugated sheets, and dispensing with sheathing boards, lessens danger from fire, thereby reducing insurance. When the liability of injury from outside contact is considerable, a heavier gauge should be used than is otherwise necessary.

Do not let the Siding have contact with the ground, but *always* use a base board.

Our Corrugated sheets can be used in various ways as a substitute for cornice work and in a very effective manner, by giving the subject consideration.

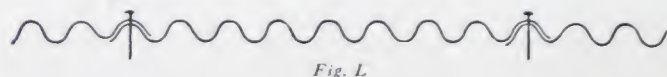


Fig. L

For Siding, lap sheets but one corrugation. If sheets are used without sheathing, it is important that studding be, from center to center of the exact covering width of the sheets.

If Siding is to be used for barns, or uses where there is a hay pressure or strain against the sheets from the inside, it will be necessary to use sufficient sheathing to hold such pressure away from sheets. If siding is used on stables, we recommend close sheathing, or, better yet, an additional paper or felt lining, as the fumes from manure pits are detrimental to all metals, roofing and sidings included. This is also true of steam and gas.

V-CRIMPED ROOFING

This style of Roofing has been in use probably as long as any other pattern, and has made for itself an enviable reputation. It may be applied to sheathing boards or lath, or directly over old shingles without removing the latter, if roof trusses and nailing will permit, and as the nails are driven directly through the roofing sheet, wooden A strip and sheathing it can be fastened down more firmly than some other styles of plain Roofing, and is therefore very favor-

ably received in those parts of the country where high winds are of frequent occurrence.

This Roofing can also be readily and successfully applied directly to rafters. This form of construction is very economical of lumber, but for securing the greatest durability we recommend that sheathing boards be applied solid to the rafters, and the Roofing sheets nailed thereon. In placing the sheets on the roof these crimps lap over each other and also over a triangular strip of wood which serves to support the joints and brace the sheets firmly.

When applying this roofing, always allow the roofing sheets to project one inch over the eaves, and then bend this projection down against the wood frame-work, nailing it fast to prevent wind

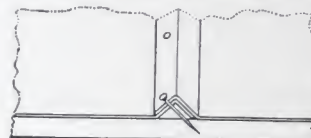


Fig. M

and water blowing underneath the Roofing. We cannot recommend V-Crimped Roofing to be used where the pitch is less than two inches to the foot; for nearly flat roofs we suggest the use of Pressed Standing Seam Roofing or Roll and Cap Roofing.

This roofing, being applied without the use of cleats or other patent fastenings, is most simple and easy in its application, and is therefore, often preferred.

Three V-Crimped is applied similar to the V-Crimped, except that the extra crimp gives an additional opportunity for nailing. This is an advantage for those districts subject to severe storms and high winds. Four V-Crimped and Five V-Crimped are newer patterns which are exceptionally popular and practical.

PRESSED STANDING SEAM ROOFING

Begin at the left-hand end of the roof, at the eaves. Let the lower edges of first course of sheets project over the eaves one inch, afterwards bending them down and nailing fast to the sheathing boards.

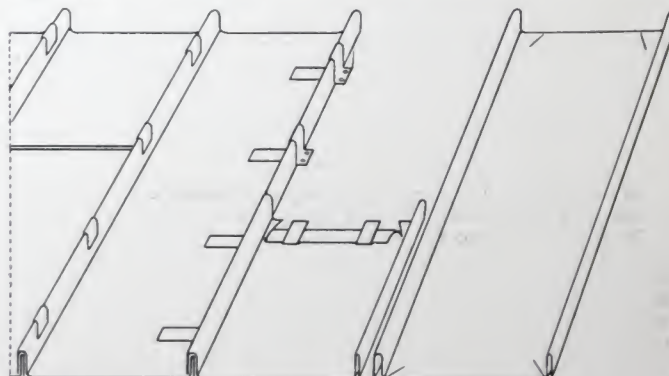


Fig. N

Make joint on upper end of sheet by turning lock with tool; then place the cleats along the single seam or flange, about one foot apart; join on another sheet the same way, turn locks at upper ends of sheets up, those at lower end down.

"Break Joints" in laying by using short or half length sheets to start every other course from eaves to ridge. Be sure to place one cleat on each sheet at the point where the cross seam comes.

When the comb or ridge is reached, allow $\frac{3}{4}$ inch to turn up at the top, which is done by using the jointer, snip the flange $\frac{3}{4}$ -inch then turn it up and put cleats about one foot apart.

Then lay the next sheet with flange or seam over, press it down, snugly, so as to hold it in place; then take the tongs and press it together closely.

Each length of standing seams must be closed with tongs, as completed.

This finishes the standing seams; continue this until this side of the roof is completed.

Be careful to keep standing seams straight in line—you will thus have the most handsome and effective work. Nail only through the cleats. Ridge should be finished with Cap or Ridge Roll. We recommend the use of a wooden mallet instead of a hammer for closing seams and locks. As in the case of V-Crimped, the sheathing should be even and of uniform thickness.

ROLL AND CAP ROOFING

For roofs having a fall of only one to two inches per foot, we recommend the use of our Roll and Cap Roofing. The reason this style of roofing is more effective than other kinds for nearly flat roofs is, that we manufacture it in rolls fifty feet long or more, from sheets which are 26 inches wide by 122 inches long, and the cross seams every ten feet are formed very perfectly with improved machinery, and when the flanges are bent up on each side these cross seams extend up to the top of these flanges, so there is no possible chance for leakage.

Being in rolls, this style of roofing is more convenient to handle on roofs where there is but slight slope to the rafters, as the side seams (which must be formed on the roof) are more easily made when the roof is nearly flat. Hence, when a roof has a pitch of, say, three inches or greater, or in any case where rafters are shorter than sixteen feet we recommend the use of our Pressed Standing Seam Roofing as being equally effective and more convenient to apply, it being in sheets 5 to 12 feet long by two feet wide, with flanges already formed on sides of each sheet.

When Roll and Cap Roofing is used, it is best that the rafters be sheathed over entirely. Begin at either side of roof, turning down the outer edge of the roll, and nail to the face board, or flash up against the wall, as the case may be. Turn up the other edge of the roll with the edging tongs, forming a flange one inch high for general cases.

Nail the cleats down to the sheathing at intervals of about twelve inches along the flanges of roll first laid, so there will be a cleat at middle and end of each cap, and after forming flanges of the same height on the next roll, place it so that the flanges of the two strips touch, and are in a straight line.

Before laying the next roll begin at eaves and put the cap over the two adjacent flanges, and as each piece of capping is laid, put the next piece in place, lapping it about one inch down over the first piece as before, continuing to the ridge.

Next, bend the vertical tongues of the cleats over the caps and flanges tightly, by hand, proceeding to at once close up the joint perfectly tight with the tongs.

When one side of ridge roof is covered, nail cleats to sheathing twelve inches apart along flange at the ridge before laying the opposite side, for use in fastening ridge caps.

The roofing must be nailed over the edge of the eaves, and must be flashed up one inch each side of ridge, the flanges so formed to be covered by the same kind of caps as used previously on side seams, attached with cleats as before explained. Hips are to be formed on the same principle, after the sheets are cut to fit, allowing enough to turn up for flanges along the hip. Valleys are to be connected with the roofing by a flat seam.

Tools for applying: 1 pair 1-inch Tongs, 1 pair Hand Shears, 1 Hammer, 1 pair Cap Squeezers and 1 Mallet.

ROLL SELF CAP ROOFING

This material is applied in a manner very similar to Roll and Cap Roofing, as described on opposite page, except, in that it is necessary to make one flange of sufficient height (1½ inches) to bend over the top of the flange placed against it, which should be about one inch high, thus forming its own cap. This pattern is also attached with cleats in order that no nails may pass through the sheets.

Tools for applying: 1 pair 1-inch Tongs, 1 pair 1¾-inch Tongs, 1 pair 1-inch Seamers, 1 pair Hand Shears, 1 Hammer and 1 Mallet.

RIDGE COVERING

Ridge Roll or Ridge Cap of some pattern should be used for covering ridges of roofs to make a weatherproof joint. It also gives the roof a finished appearance. We make a number of patterns adapted for use either with the corrugated or plain sheets. Their application is so simple that specific directions are not required.

WEATHERBOARD SIDING

As an effective and fire-proof substitute for wooden weatherboarding, our sheets formed in imitation of them are attracting general attention and meeting with success wherever used.

This material can be attached to rough sheathing boards, or directly to studding placed 16 inches apart between centers. In applying our Weatherboard Siding, it is necessary to lap the sheets one crimp at sides and 2 or 3 inches at ends. Place nails about 4 to 6 inches apart along the horizontal laps when the sheets are put on sheathing, and immediately under the projecting crimp always. When applying to studding, nail to each stud. At vertical laps place one nail at the uppermost edge of each face or "board." Place a few nails throughout the body of the sheet so as to hold it firmly against the sheathing or studding. All nails must be driven directly under the projections to avoid indenting the sheets. No special tools are required in putting on this siding, and any ordinary mechanic can do the work well and neatly if ordinary caution is used to keep the lines straight horizontally. This is important.

BRICK AND STONE SIDINGS

Begin at the lower right hand corner of building and proceed from right to left. Before starting the first course, if the frame work rests on the ground, place a wood strip or base board around the entire base of building, resting the lower row of sheets of Siding thereon to prevent direct contact with the ground, which induces corrosion. After the first course is laid, if there is a half or piece of sheet left over, use this to begin the second course; thus breaking the joints vertically.

In lapping the sheets, be careful to keep all joints in straight lines; this is important if neat appearing work is desired. In nailing we suggest placing nails in the grooves only; this will hold the entire body of the sheet close to the sheathing boards, and prevent sagging or buckling. Use a steel punch to make holes for nails, and a nail set to drive nails home without injuring the sheet.

Always lay sheets with the concave or hollowed part of mortar line on the outside.

When Stone Siding is carefully applied, all the lines being kept straight, it may be then painted with a coat of thick gray or brown paint, and dashed with pebbles or coarse sand—a most excellent imitation of stone will be the result. The general effect can be yet further enhanced by lining out between the stones with a lighter paint, thus giving the effect of "pointing".

Brick Siding may be improved in appearance by giving the surface a good coat of brick-red paint, then painting mortar lines a grayish white. Care should be taken to select a proper shade of red.

BEADED CEILING OR SIDING

The use of Sheets—Corrugated, Crimped or Beaded—for ceiling purposes, has proven quite successful and satisfactory.

We do not manufacture the fancy patterns of Stamped Sheet Steel Ceilings, as there are those who make a specialty of this style of work. Our Beaded Ceiling or Siding is particularly well adapted for storerooms, warerooms, halls, factories, etc.

This product can be applied directly to joists, if latter are level, or to rough sheathing over the joists, or over the plaster. In the first case, work is not so rapid as in the second where sheathing is used, and in some places is not attended with as good results.

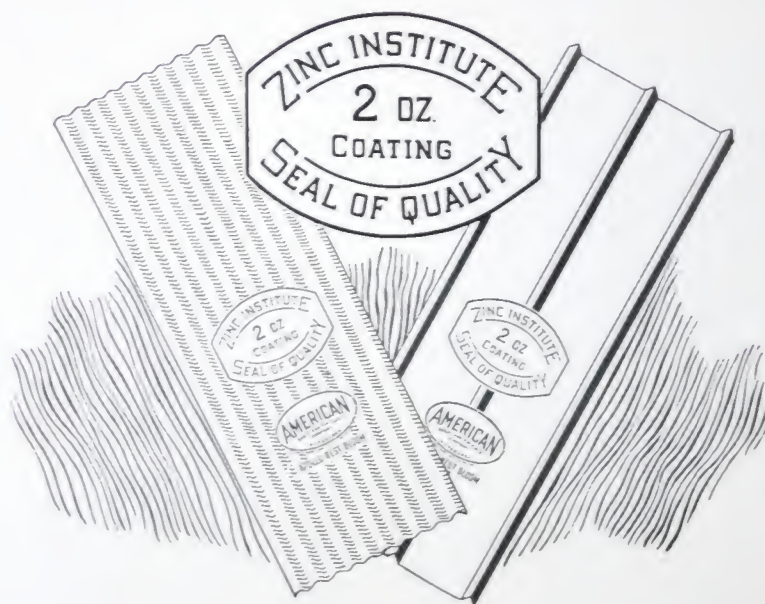
The advantage in the case of applying steel or iron over plaster is that it can be done without removing the old plaster, and thereby very little dirt is occasioned; besides, it does not greatly interfere with business if it is put up in a store or office room. This item of cleanliness, where re-ceiling is necessary, is indeed important and worthy of consideration.

Builders and all practical men know that it is useless to adopt plaster ceilings in business houses, factories, etc., where there is much jarring or vibration from machinery and handling of heavy goods, for this will soon cause the plaster to fall off. The weight of metallic ceilings, such as we make, is probably not over 20 per cent. of the weight of plaster, so that this item figures conspicuously in preparing the frame work for any room of considerable size.

No special tools are required to apply this Beaded Ceiling. The sheets should be lapped one or two inches at ends, and over one crimp at sides, and carefully nailed.

AMERICAN HEAVY-COATED Galvanized

Specially Manufactured for
Steel Roofing and Siding

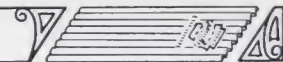


LONGER LIFE SHEETS

The growing demand for heavily coated galvanized Roofing and Siding has resulted in this Company's manufacturing Corrugated and V-cripped Galvanized Sheets carrying TWO OUNCES of zinc coating per square foot—at least TWO-THIRDS MORE than the regular grade. This means *longer life* for comparatively little extra cost.

DOUBLE ASSURANCE of protection and service may be had by the use of this new product, as all the sheets are branded with the American Zinc Institute's "Seal of Quality" and the well-known APOLLO Best Bloom brand. Furnished in No. 28 gauge and heavier.

AMERICAN "Seal of Quality" Galvanized Sheets are *not* regular commercial galvanized, but are a *special grade* that is the result of the ever increasing call of consumers for high grade and more *heavily coated* Galvanized Roofing and Siding products. We shall be pleased to furnish full information on this superior product. Also supplied with a KEYSTONE Rust-resisting Copper Steel base, when so specified.



Formed Roofing and Siding Products

$\frac{5}{8}$ INCH CORRUGATED



Formed from Black, Painted or Galvanized Sheets, No. 24 Gauge and lighter. Standard formed width 25 inches, covering $24\frac{3}{4}$ inches when lapped one corrugation. Standard depth of corrugation, $\frac{5}{8}$ inch. Standard lengths 5, 6, 7, 8, 9 and 10 feet.

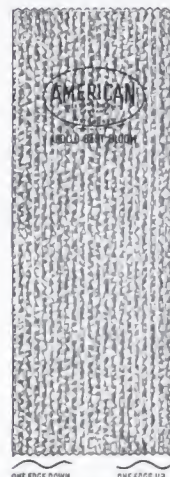
EASTERN
 $1\frac{1}{4}$ INCH CORRUGATED



(Both Edges Down)

Formed from Black, Painted or Galvanized Sheets, No. 18 Gauge and lighter. Standard formed width 25 inches, covering $23\frac{3}{4}$ inches when lapped one corrugation. Standard depth of corrugation, $\frac{1}{4}$ inch. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet.

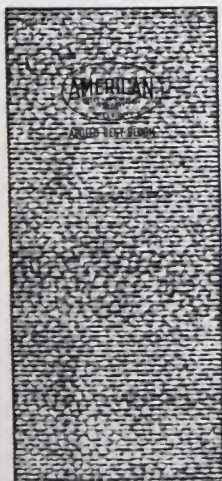
STANDARD
 $1\frac{1}{4}$ INCH CORRUGATED



ONE EDGE DOWN ONE EDGE UP

Formed from Black, Painted or Galvanized Sheets, No. 20 Gauge and lighter. Standard formed width 26 inches, covering 24 inches when lapped one and one-half corrugations. Standard depth of corrugation, $\frac{1}{4}$ inch. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet.

$\frac{3}{16}$ INCH CRIMPED



Formed from Black, Painted or Galvanized Sheets, No. 24 Gauge and lighter, not wider than 30 inches—crimped crosswise.

The crimps materially stiffen the sheet, and also add to its appearance when applied.

STANDARD 2 INCH CORRUGATED



Formed from Black, Painted or Galvanized Sheets No. 16 Gauge and lighter. Standard formed widths 26 and 27 inches, covering 24 inches when lapped one and one-half corrugations, respectively. Standard depth of corrugation, $\frac{1}{4}$ inch. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet.

STANDARD $2\frac{1}{2}$ INCH CORRUGATED
(Actual $2\frac{3}{8}$ inches)



Formed from Black, Painted or Galvanized Sheets, No. 8 Gauge and lighter. Standard formed widths 26 and $27\frac{1}{2}$ inches, covering 24 inches when lapped one and one-half corrugations, respectively. Standard depth of corrugation, $\frac{1}{2}$ inch. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet.

For Standard Weights of above Products see Tables on Page 26.

AMERICAN "Seal of Quality" HEAVY-COATED GALVANIZED also supplied in Corrugated and V-Crimped.

When Keystone Copper Steel is used—



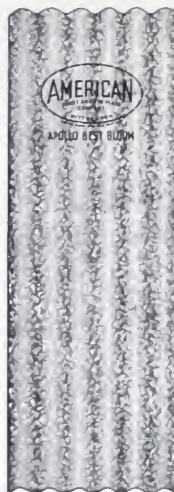
—Look for this special quality brand.

STANDARD 3 INCH CORRUGATED



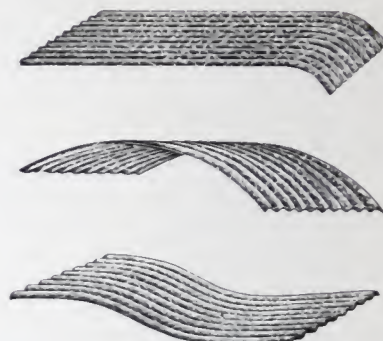
Formed from Black, Painted or Galvanized Sheets, No. 12 Gauge and lighter. Standard formed widths 26 and 27½ inches, covering 24 inches when lapped one and one and one-half corrugations, respectively. Standard depth of corrugation, ⅜ inch. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet.

5 INCH CORRUGATED



Formed from Black, Painted or Galvanized Sheets, No. 11 to 22 gauge inclusive. Standard formed widths 29 inches, covering 25 inches when lapped one corrugation. Standard depths of corrugation, ⅜ and 1¼ inch. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet.

CURVED CORRUGATED



Formed from Black, Painted or Galvanized Sheets in Standard 2½ and 3, in Eastern 1¼, and in 5 inch corrugations, of heaviest gauge (not heavier than No. 12) and longest length corrugated. Curved to any desired radius.

Curved corrugated sheets are specially adapted to arches, awnings, dormer and ventilator roofs, and similar purposes; and also to culverts, cellars and underground uses. The advantages of these sheets are strength, lightness and durability.

If both edges are finished the same way, it should be specified whether the edges are to be toward the inside or outside of curve.

V-CRIMPED ROOFING



V-Crimped patterns are very popular

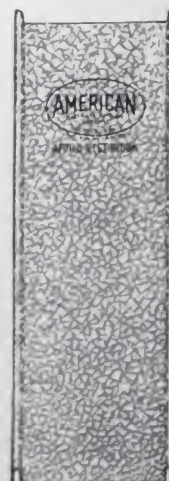
TWO AND THREE V-CRIMPED ROOFING

Formed from Black, Painted or Galvanized Sheets, No. 20 Gauge and lighter. Standard covering width 24 inches. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet. V-wood sticks furnished when ordered. The middle crimp stiffens the roof, and enhances its appearance.

FOUR AND FIVE V-CRIMPED ROOFING

Formed from Black, Painted or Galvanized Sheets, No. 20 Gauge and lighter. Standard covering width 24 inches, lapped two crimps. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet. V-wood sticks furnished when ordered. The double crimp lap possesses some advantages over the single crimp lap patterns.

PRESSED STANDING SEAM ROOFING



Formed from Black, Painted or Galvanized Sheets, No. 20 Gauge and lighter. Standard covering width 24 inches. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet. This form may be used on roofs of very slight pitch as the high seams prevent the water from rising over the joints. Cleats furnished when ordered. End locks turned if desired.

For Standard Weights of above Products see Tables on Page 26.

AMERICAN "Seal of Quality" HEAVY-COATED GALVANIZED also supplied in Corrugated and V-Crimped.

When Keystone Copper Steel is used—



—Look for this special quality brand.

**ROLL SELF CAP ROOFING, OR
PLAIN ROLL ROOFING**



Formed from Black, Painted or Galvanized Sheets, No. 24 Gauge and lighter. Standard full width 26 1/2 inches. Maximum width 29 inches. Sheets accurately trimmed.

Furnished in 50 or 100 lineal feet rolls, having covering surface of 100 and 200 square feet respectively. Cleats furnished when ordered; cross locks are double seamed, but single seamed locks can be furnished. End locks are turned.

ROLL AND CAP ROOFING



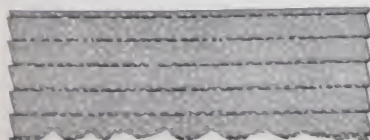
Similar to product described above, except that standard full width is 26 inches, and that caps and cleats are supplied unless otherwise ordered.

BEADED CEILING OR SIDING



Formed from Black, Painted or Galvanized Sheets, No. 24 Gauge and lighter. Standard covering width 24 inches. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet. Beads are 3 inches from center to center.

WEATHERBOARD SIDING



Formed from Black, Painted or Galvanized Sheets, No. 22 Gauge and lighter. Standard covering width 24 inches. Standard lengths 5, 6, 7, 8, 9 and 10 feet. Maximum length 12 feet. Standard board has 4 inch face and depth of 1/2 inch.

CORRUGATED RIDGE ROLL



Formed from Black, Painted or Galvanized Sheets in 2 1/2 inch roll to fit Eastern 1 1/4, Standard 1 1/4, and Standard 2 1/2 inch corrugations—minimum girt 11 inches; and to fit Standard 3 inch corrugated, in 3 inch roll—minimum girt 12 inches. The last three are made as long as 120 inches, the first, 30 inches.

**CORRUGATED RIDGE ANGLE
OR
CORRUGATED V-RIDGE CAP**



Formed from Black, Painted or Galvanized Sheets to fit Eastern 1 1/4, Standard 1 1/4, Standard 2 1/2, and Standard 3 inch corrugations—minimum girt 8 inches. The first two are made as long as 120 inches, the last two, 30 inches.

PLAIN BRICK SIDING



Formed from Black, Painted or Galvanized Sheets, No. 26 Gauge and lighter. Standard size 28x60 inches. Size of each brick approximately 2 1/8 x 8 3/4 inches.

ROCK FACE BRICK SIDING



Formed from Black, Painted or Galvanized Sheets, No. 26 Gauge and lighter. Standard size 28 x 60 inches. Size of each brick approximately 2 1/8 x 8 3/4 inches.

PLAIN RIDGE ROLL



Formed from Black, Painted or Galvanized Sheets, No. 16 Gauge and lighter, in any length up to 10 feet. Standard length 8 feet; standard girt 12 inches with 2 1/2 inch diameter roll, proportional girt for other rolls of 1 1/4 to 3 inches diameter.

**PLAIN RIDGE ANGLE
OR
PLAIN V-RIDGE CAP**



Formed from Black, Painted or Galvanized Sheets, No. 16 Gauge and lighter, in any length up to 10 feet. Standard length 8 feet; standard girt 10 inches.

**CORRUGATED SIDE WALL
FLASHING**



Formed from Black, Painted or Galvanized Sheets, No. 18 Gauge and lighter; to fit any corrugation in any length up to and including 10 feet. Standard length 8 feet. Standard apron about 6 inches.

**CORRUGATED END WALL
FLASHING**



Formed from Black, Painted or Galvanized Sheets, No. 20 Gauge and lighter, to fit Eastern 1 1/4 and Standard 1 1/4 and 2 1/2 inch corrugations. Covering length of latter, 24 inches when lapped one and one-half corrugations. Standard apron about 6 inches.

ROCK FACE STONE SIDING



Formed from Black, Painted or Galvanized Sheets, No. 26 Gauge and lighter. Standard size of Sheets 28 x 60 inches. Size of single stone approximately 7 x 12, or 9 1/2 x 20 inches, as desired.

For Standard Weights of above Products see Tables on Page 26.

AMERICAN "Seal of Quality" HEAVY-COATED GALVANIZED also supplied in Corrugated and V-Crimped

When Keystone Copper Steel is used—



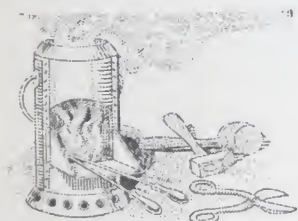
—Look for this special quality brand.

— Manufactured by —
American Sheet and Tin Plate Company

NOTE—All the Roofing and Siding Products manufactured by this Company bear stencils whereby they may be easily recognized and the trade assured of sheets that are strictly standard and full weight.

Keystone Copper Steel Roofing Ternes

THERE is no disputing the many advantages of good TERNE ROOFS for homes and high grade buildings. As a roofing material adapted to all classes of structures, terne plates (Roofing Tin) easily head the list. But they must be good terne plates. You frequently hear complaints that terne roofs do not last as long as they did formerly. This complaint may be justified, but it is due to the tendency to buy cheap plates and then put them on the roof as cheaply as possible. You can buy as good or better plates to-day than ever before—plates that are honestly manufactured, uniform in coating, and high in quality. It is absolutely essential that roofing terne plates be properly applied. The best skilled labor is cheapest in this instance. One reason that the old time terne roofs proved so eminently satisfactory, was the quality of workmanship that went with them. When properly applied, our KEYSTONE Copper Steel (Open Hearth) ternes will make roofs that will give absolute protection, and lasting and satisfactory service. These plates are stamped "Keystone Copper Steel" in addition to brand and weight of coating.



ROOFING TERNE PLATES



MF ROOFING TERNES

are made only of the best material, by experienced workmen, and are carefully coated by the hand-dipping, Pure Palm Oil process. MF carries 32 pounds coating, and is the most popular roofing terne plate manufactured. It has been made continuously since 1822. Produced from a Keystone Copper Steel base.

U. S. EAGLE ROOFING TERNES

Positively the highest quality Terne Plate produced in this country. Base of Keystone Copper Steel—coating 40 pounds, applied by a special process—these are roofing plates par excellence.

AMERICAN NUMETHODD ROOFING TERNES

American Numethodd B.	40-Pounds Coating, Keystone Copper Steel
American Numethodd D.	30-Pounds Coating, Keystone Copper Steel
American Numethodd F.	20-Pounds Coating, Keystone Copper Steel

AMERICAN OLD STYLE ROOFING TERNES

American Old Style AAAAA	40-Pounds Coating, Keystone Copper Steel
American Old Style AAA	30-Pounds Coating, Keystone Copper Steel
American Old Style AA	25-Pounds Coating, Keystone Copper Steel
American Old Style A	20-Pounds Coating, Keystone Copper Steel

AMERICAN ROOFING TERNES

American Special	15-Pounds Coating, Keystone Copper Steel
American	8-Pounds Coating, Keystone Copper Steel

AMERICAN FIRE DOOR STANDARD TERNES

20-Pounds Coating—carefully manufactured to meet the underwriters' requirements. This product will be found satisfactory for all fire door purposes.

AMERICAN LONG TERNES—40-pounds Coating.

A sheet mill product that is proving popular for roofing, particularly valley, eave trough and conductor pipe. It is offered in standard weights and sizes. The sheets are resquared when so ordered, and this is essential for roofing. The finish may be bright, or oil, as specified. Lighter than 10-oz. base gauge may be embossed with private or AMERICAN brand, including gauge and coating weight. Keystone Copper Steel should always be ordered for Long Ternes that are to be subjected to weather exposure.

NOTE—Keystone Copper Steel (Open Hearth) Roofing Ternes are also furnished to meet the individual requirements of sheet metal jobbers who have their own private brands. It is to your interest, however, to see that your plates are distinctly stamped—

"KEYSTONE COPPER STEEL"



Useful Information for Builders and Property Owners

ROOFING TERNE PLATES

And their Application

Roofs constructed with low pitch are made with flat seams, and should preferably be covered with high grade ternes, 20 pounds coating or heavier, of sheets 14x20 inches rather than of sheets 20x28 inches, because the larger number of seams stiffens the surface and helps to prevent buckles and rattling in stormy weather. For flat seam roofs, cleats should be used 8 inches apart, fastened by 2 nails to the cleat. Some roofers use 1-inch barbed and tinned roofing nails, driven 6 inches apart, well under the edge. They should be well covered and the seams should be pounded down over the edge. Nails must never be exposed.

Steep terne roofs, (not less than 4 to 6 inches rise per foot) should be made with standing seams and from sheets 20 x 28 inches, fastened with cleats 12 inches apart, 2 nails to the cleat. The nails should be driven into the cleats only.

The under side of the roofing should be given a coat of good paint before laying.

While it is always cheapest to use the best material, roofing plates with a lighter coating may be used for steep standing seam roofs. IC roofing plates, in which the base plate weighs about 50 pounds per 100 square feet, are more used than IX plates, 62 pounds per 100 square feet.

For valleys, gutters and spouts of a terne roof, use only terne plates for most satisfactory results.

For spouts, valleys and gutters, heavily coated IX plates should always be used.

The terne coating on the lighter plates should in all cases be fully as heavy as on the heavier plates.

Plates bearing light coatings may be suitable for some purposes other than roofing, or for roofs of temporary buildings, but for roofs that are expected to last, the more heavily coated plates should be used.

The use of acid in soldering seams in a tin roof is to be carefully avoided; acid, coming in contact with the metal of the cut edges and corners where the sheets are folded and seamed together, will cause rusting. No other soldering flux than good rosin should be used.

Every roof should be carefully cleaned, and all rosin spots and other detrimental substances should be removed as the tinner's work is being finished. Lumps of rosin left on the roof will melt in the sun, stick to the roof, cause blisters and prevent paint from adhering.

Workmen on the roof should wear soft soles, to obviate injury to the coating of the terne plate.

The sheathing boards underlying the roofing terne should be laid with tight joints. The wood should be well seasoned, dry, and free from resinous knots. It may be advisable to cover the boards with good building paper before the tin is laid; no paper containing tar or trace of acid should be used.

When no paper is used the ternes must in all cases be painted on the under side with good reliable oil paint before they are laid and fastened on the roof. The outside should receive two coats of paint as soon as roof is finished.

ADVANTAGES OF TERNE ROOFS

Among the many advantages of good terne roofs we mention the following:—

- Reasonable cost.
- Lasting service.
- Low cost of maintenance.
- Protection from fire and lightning.
- Absolutely weatherproof.
- Reduced weight on the roof.
- Adapted to all forms and pitches of roofs.
- Neat appearance. Clean and sanitary.

It will pay you to investigate fully the claims and advantages of good terne roofing before making a decision on this matter so important to the safety and durability of your home and property.

FLAT SEAM TERNE ROOFING

Table showing number of 14" x 20" sheets required to cover various areas in square feet with flat seam terne roofing. Flat seams, locked $\frac{1}{2}$ ", take $1\frac{1}{2}$ " from both width and length, leaving covering area of 231 $\frac{1}{4}$ sq. in. In the table, a fractional part of a sheet is counted as a full sheet.

No. of sq. ft.	Sheets required	No. of sq. ft.	Sheets required	No. of sq. ft.	Sheets required	No. of sq. ft.	Sheets required
100	63	330	206	560	349	790	492
110	69	340	212	570	355	800	499
120	75	350	218	580	362	810	505
130	81	360	225	590	368	820	511
140	88	370	231	600	374	830	517
150	94	380	237	610	380	840	524
160	100	390	243	620	387	850	530
170	106	400	250	630	393	860	536
180	113	410	256	640	399	870	542
190	119	420	262	650	405	880	548
200	125	430	268	660	411	890	555
210	131	440	274	670	418	900	561
220	137	450	281	680	424	910	567
230	144	460	287	690	430	920	573
240	150	470	293	700	436	930	580
250	156	480	299	710	443	940	586
260	162	490	306	720	449	950	592
270	169	500	312	730	455	960	598
280	175	510	318	740	461	970	605
290	181	520	324	750	468	980	611
300	187	530	331	760	474	990	617
310	194	540	337	770	480		
320	200	550	343	780	486		

1,000 square feet, 623 sheets.

A package of 112 sheets, 14" x 20", covers approximately 180 square feet.

STANDING SEAM TERNE ROOFING

Table showing number of 20" x 28" sheets required to cover various areas in square feet with standing seam terne roofing. Standing side seams, $\frac{3}{4}$ " to $\frac{1}{2}$ " high, locked $\frac{3}{8}$ " to $\frac{1}{2}$ ", take $2\frac{1}{2}$ " from width, and flat end seams take $1\frac{1}{2}$ " from length, leaving covering area of 457 $\frac{1}{4}$ sq. in. In the table a fractional part of a sheet is counted as a full sheet.

No. of sq. ft.	Sheets required	No. of sq. ft.	Sheets required	No. of sq. ft.	Sheets required	No. of sq. ft.	Sheets required
100	32	330	104	560	177	750	246
110	35	340	108	570	180	760	249
120	38	350	111	580	183	770	253
130	41	360	114	590	186	780	256
140	45	370	117	600	190	790	259
150	48	380	120	610	193	800	262
160	51	390	123	620	196	810	265
170	54	400	127	630	199	820	268
180	57	410	130	640	202	830	271
190	60	420	133	650	205	840	275
200	64	430	136	660	208	850	278
210	67	440	139	670	212	860	281
220	70	450	142	680	215	870	284
230	73	460	145	690	218	880	287
240	76	470	149	700	221	890	290
250	79	480	152	710	224	900	294
260	82	490	155	720	227	910	297
270	86	500	158	730	231	920	300
280	89	510	161	740	234	930	303
290	92	520	164	750	237	940	306
300	95	530	168	760	240	950	309
310	98	540	171	770	243	960	312
320	101	550	174				

1,000 square feet, 316 sheets.

A package of 112 sheets, 20" x 28", covers approximately 356 square feet.

The common sizes of terne plates are 10x14" and multiples of that measure. The sizes most generally used are 14x20" and 20x28".

WEIGHTS OF ROOFING MATERIALS

Table showing approximate weights per square foot of various materials used for roofing.

MATERIAL	Av. Wt. —lb. per sq. ft.
Corrugated Galvanized Sheet Steel	
No. 18 G. S. G.	23 $\frac{1}{4}$
No. 20 G. S. G.	21 $\frac{1}{4}$
No. 22 G. S. G.	19 $\frac{1}{4}$
Copper, No. 22 B. & S. G.	13 $\frac{1}{4}$
Felt, 2 layers	1 $\frac{1}{2}$
Felt and Asphalt or Coal Tar	2
Glass, $\frac{1}{4}$ inch thick	13 $\frac{1}{4}$
Hemlock sheathing, 1 inch thick	2 $\frac{1}{4}$
Lead and plaster ceiling (ordinary)	6 to 8
Lead, $\frac{1}{2}$ inch thick	7 $\frac{1}{2}$
Shingles, 6x18— $\frac{1}{4}$ to weather	2
Skylight of glass, $\frac{1}{4}$ to $\frac{1}{2}$ inch, including frame	4 to 10
Slag roof, 4-ply, with cement and sand	4
Slate, $\frac{1}{4}$ inch thick, 3 inch double lap	4 $\frac{1}{2}$
Slate, $\frac{1}{4}$ inch thick, 3 inch double lap	6 $\frac{1}{4}$
Spruce sheathing, 1 inch thick	2 $\frac{1}{4}$
Terne plate, IC	5 $\frac{1}{4}$
Terne plate, IX	3 $\frac{1}{4}$
Tiles (plain) 10 $\frac{1}{2}$ x 6 $\frac{1}{2}$ x $\frac{1}{2}$ —5 $\frac{1}{4}$ inches to weather	18
Tiles (Spanish) 14 $\frac{1}{2}$ x 10 $\frac{1}{2}$ —7 $\frac{1}{4}$ inches to weather	8 $\frac{1}{4}$
White pine sheathing, 1 inch thick	2 $\frac{1}{4}$
Yellow pine sheathing, 1 inch thick	3 $\frac{1}{4}$
Zinc, No. 20 B. & S. G.	1 $\frac{1}{4}$

Note the advantage of using sheet metal to reduce weights on roofs.

CORRUGATED SHEETS

Allowances for Laps

An approximate allowance for laps in standard roofing is 20 to 25 percent., and in standard siding, 12 to 18 percent., of the area to be covered. The usual lap is 1 $\frac{1}{2}$ corrugations on the side and 6" on the end, for standard roofing; and 1 corrugation on side and 4" on end, for standard siding.

The following table is of standard 2 $\frac{1}{2}$ " corrugated sheets 96" long and shows approximately the square feet required to cover one square (100 sq. ft.), with various end laps.

Formed Width, inches	Covering Width, inches	Side Lap, corrugations	End Lap, inches			
			3	4	5	6
26	24	1	112	113	114	116
27 $\frac{1}{2}$	24	1 $\frac{1}{2}$	118	120	121	122
28 $\frac{1}{2}$	24	2	123	125	126	127
26	21 $\frac{1}{2}$	2	126	127	129	130

CORRUGATED SHEETS

Approximately Uniformly Distributed Safe Load

W = total allowable uniform load, pounds
b = curvilinear width of sheets, inches
(b = 1.075 x formed width for standard 2 $\frac{1}{2}$ " corrugations)
l = unsupported length of sheet, inches
t = thickness of sheet, inches
d = depth of corrugations, inches
(d = .50 inch, for standard 2 $\frac{1}{2}$ " corrugations)
f = allowable fiber stress, lb. per sq. in.
Then $W = \frac{8f}{l} \times \frac{4bdt}{15} = \frac{32fbd}{15l}$
for $f = 12000$, $W = \frac{25.600 bdt}{l}$

ROOF PAINTING

All ordinary sheet metal exposed to the elements should be given a protective coating. Even the zinc coating of galvanized sheets is gradually weathered away, and the application of a good paint, renewed at proper intervals according to climatic conditions, will prolong the useful life of sheets almost indefinitely.

All sheets should be clean, so as to obtain close contact of paint and metal. Uncoated (black) sheets should be free from loose mill oxide and rust, and, if necessary, wire brushed and wiped with turpentine or gasoline. Grease and oil may be washed off with a suitable solvent, such as naphtha or toluol. Terne coated (roofing tin) is best wiped with benzine, turpentine, or benzol to remove the oil film. Zinc coated (galvanized) is best prepared by simple exposure to the weather for a few months until the luster disappears. If necessary to apply paint to new zinc coated sheets, they should first be brushed with a solution of four ounces of copper sulphate, copper chloride, or copper acetate in one gallon of water, and after drying again brushed lightly. Better results may be obtained, if facilities permit, by cleaning with a solution of 200 parts of water, 30 parts trisodium phosphate, and 4 parts of sodium hydroxide, all by weight, at 140 to 180° F., then washing with hot water, followed by etching at room temperature for about one-half minute with solution of 1000 parts water, 200 parts muriatic acid, and 20 parts ammonium nitrate, all by weight, and then washing and thoroughly drying.

The weather should be clear and dry and the paint preferably applied in the afternoon, especially the priming coat, as it is essential that the surface be free from moisture. It is preferable to coat the surfaces in laps with fairly thick priming paint as the sheets are placed in position. The paint may be applied by brush or spray. The priming coat should be thin enough to fill and wet all parts as too thick a paint is liable to bridge over depressions and joints. The finish coat or coats should be thicker, and a total of not less than two coats should be applied, giving time for proper drying between coats.

Paint applied directly to sheet metal should be rust inhibitive, and the priming coat should, therefore, have a basic pigment, such as red lead, lead chromate, or zinc chromate—zinc dust and zinc oxide, three or four to one, make efficient paint for both priming and finishing, especially as primer for zinc coated (galvanized) sheets. Iron oxide paint is used for priming and has given good service, but much better protection is obtained if it contain 10 per cent or more of basic or chromate pigment, such as zinc oxide, red lead, or zinc chromate. The pigment for the finish may be of any good moisture excluder of suitable color. Linseed oil, preferably boiled, makes a good vehicle for the pigment, and excessive dryer should not be used. The use of boiled linseed oil or durable mixing varnish as part of the last coat adds to gloss and water resistance. It is economy to use only the best grades of paint for metal work.

More extensive information may be gained from "Paints for Metal," by Henry A. Gardner, Chemical Engineer, Institute of Paint and Varnish Research, Washington, D. C.

EXCAVATIONS

Excavations are measured by the yard (27 cubic feet) and irregular depths or surfaces are generally averaged in practice.

MASONRY

Stone masonry is measured by two systems, Quarryman's and Mason's Measurements.

By the Quarryman's Measurements the actual contents are measured—that is, all openings are taken out and all corners are measured single.

By Mason's Measurements, corners and piers are doubled and no allowance made for openings less than 3'0" x 5'0" and only half the amount of openings larger than 3'0" x 5'0".

Stone walls are measured by the perch (24½ cubic feet). Openings less than three feet wide are counted solid; over three feet deducted, but 18 inches are added to the running measure for each jamb built.

BRICK WORK

Brick work is generally measured by 1,000 bricks laid in the wall. In consequence of variations in size of bricks, no rule for volume of laid brick can be exact. The following scale is, however, a fair average

- 8 com. bricks to a super. ft. 4 in. wall.
- 14 com. bricks to a super. ft. 9 in. wall.
- 21 com. bricks to a super. ft. 13 in. wall.
- 28 com. bricks to a super. ft. 18 in. wall.
- 35 com. bricks to a super. ft. 22 in. wall.

Common bricks are 7¼ to 8 inches long by 4¼ wide, and 2½ inches thick. Front bricks are ¼ inch longer and wider.

One and one-eighth barrels of lime and ¾ yard of sand will lay 1000 common brick.

Corners are not measured twice, as in stone work. Openings over 2 feet square are deducted. Arches are counted from the spring. Fancy work counted 1½ bricks for 1. Pillars are measured on their face only.

A cubic yard of mortar requires 1 cubic yard of sand and 9 bushels of lime, and will fill 30 hods.

One thousand bricks closely stacked occupy about 56 cubic feet.

One thousand old bricks, cleaned and loosely stacked occupy 72 cubic feet.

One superficial foot of gauged arches requires 10 bricks.

Pavements, according to size of bricks, take 38 brick on flat and 60 brick on edge per square yard, on an average.

Five courses of brick will lay 1 foot in height on a chimney, 6 bricks in a course will make a flue 4 inches wide and 12 inches long, and 8 bricks in a course will make a flue 8 inches wide and 16 inches long.

CONCRETE WORK

The use of concrete has become so general that every farmer will find occasion to use it. Good results can be obtained only with good materials and careful workmanship. Course sand and graded gravel or broken stone, free from clay, loam or vegetable matter are necessary. Get a standard Portland Cement, not the cheapest, for good work. Universal Portland Cement is always good. If the gravel is dirty wash it in a tilting box with plenty of water till the clay or loam is gone. Never use gravel as it comes from the bank or creek, but put it over a one-quarter inch screen and re-mix the part passing through the screen and the part retained on the screen in the proportions given for sand and gravel in the accompanying table. Find in the table the mixture of cement, sand and gravel needed for your work. Less cement than here shown is poor economy, as the resulting concrete will not satisfactorily fulfill the purpose for which it was constructed. In the following table the figures represent proportion of the mix. For instance, the 1:2:3 mix; calls for one sack of cement which equals one cubic foot, two cubic feet of sand, and three cubic feet of screened gravel or crushed stone, preferably between one-quarter of an inch and an inch and one-half in size.

It will be noticed that under the 1:2:3 mix is given feeding floors, cellar floors, barn and stable floors, sidewalks and steps. This refers to the one course work or work in which no mortar surface is placed on the concrete, sufficient mortar being worked up from the body of the concrete to be finished easily.

Under the 1:2½:5 mix, is shown base course for feeding floors, cellar floors, etc. For such work with such a mixture one inch of a 1 to 2 sand and cement mortar should be placed on top. Mixtures required for various work.

Mix 1:2:3	Mix 1:2:4	Mix 1:2½:5	Mix 1:3:6
Thin slabs All small reinforced work Feeding floors Cellar floors Barn and stable floors, sidewalks, steps, etc.	Blocks Fence posts Tanks Hog wallows Driveways Heavy reinforced work	Monolithic walls unreinforced Base course for feeding floors Cellar floors, walks, steps	Foundations Abutments Weights

Concrete may either be mixed by hand or by a mechanical mixer. In all cases a batch mixer should be used and great care taken to see that the proper proportions are placed in it and that the mixing is continued sufficiently long and with the right amount of water to give uniform consistency and color throughout.

For hand mixing the following method will prove most satisfactory.

Make a measuring box without top or bottom, one foot high, three feet long, and 16 inches wide inside. Nail on stave handles. This will hold 4 cubic feet and every three inches of height equals one cubic foot of material in the box.

For a one bag batch using a 1:2:3 mixture fill the measuring box one half full of sand, raise the measuring box from the platform and spread one sack of Portland cement over it. This platform

should be sufficiently tight so that it will not leak water and sufficiently smooth to allow mixing to be done easily. Turn the concrete starting at one end and working toward the other, then turn at least once more or as many times as necessary to make this batch of a uniform color. Fill the measuring box with 3 cubic feet of gravel or crushed stone, this will require it to be filled three quarters full or a total height of 9 inches. Mix thoroughly dry until the mass is of a uniform color, making at least three complete turnings of the dry material.

Wet down with water from a sprinkling can, and continue to mix until the mass is homogeneous and of uniform color. As soon as the concrete is mixed place it in the forms. The sooner it is placed, the better. Be sure to spade the concrete at the side of the forms well in order to allow the mortar to flow against the form surface, thereby making a true uniform surface impervious to water and moisture. As soon as the concrete is sufficiently hardened the forms may be removed, but the concrete should be kept wet, by sprinkling and protection from the sun and wind for at least seven days. Water is a necessity for good concrete. Under ordinary summer temperatures concrete may be put into service within 10 to 15 days after it is placed. However, weather will require the concrete to be allowed to harden longer before being put into service. Frost will effect concrete when it has not yet hardened and even though the temperature is above freezing the hardening of the concrete will be retarded materially whenever the temperature is below 40°.

Heating of sand, gravel, stone and water and protection of work after placed will result in first class work even at winter temperatures.

PLASTERING

High grade metal lath possesses many advantages over the old wooden lath. Metal lath is rigid, strong, fireproof, crackproof, and verminproof, while the apertures offer a perfect clinch or mortar key. If wooden laths are used, one thousand laths will cover 70 yards of surface, and 11 lbs. of lath nails will nail them on; 8 bushels of good lime, 16 bushels of sand and 1 bushel of hair will make enough good mortar to plaster 100 square yards.

SAFE BEARING LOADS

Brick and Stone Masonry	Lbs. per Sq. in.
Brickwork	
Bricks, hard, laid in lime mortar.....	100
Hard, laid in Portland Cement mortar.....	200
Hard, laid in Rosedale Cement mortar.....	150
Masonry	
Granite, capstone.....	700
Squared stonework.....	350
Sandstone, capstone.....	350
Squared stonework.....	175
Rubble stonework, laid in lime mortar.....	80
Rubble stonework, laid in cement mortar.....	150
Limestone, capstone.....	500
Squared stonework.....	250
Rubble, laid in lime mortar.....	80
Rubble, laid in cement mortar.....	150
Concrete, 1 Portland, 2 sand, 5 broken stone.....	150
Foundation Soils	Tons per Sq. Ft.
Rock, hardest in native bed.....	100—
Equal to best ashlar masonry.....	25-40
Equal to best brick.....	15-20
Clay, dry in thick beds.....	4-6
Moderately dry, in thick beds.....	2-4
Soft.....	1-2
Gravel and coarse sand, well cemented.....	8-10
Sand, compact and well cemented.....	4-6
Clean, Dry.....	2-4
Quicksand, alluvial soils, etc.....	.5-1

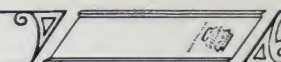
LUMBER MEASUREMENTS

In measuring lumber, boards 1 inch thick or less are estimated by the square foot of surface. Thus, a board 1 foot wide and 15 feet long would contain 15 square feet, or 15 feet board measure, if the board were 1 inch thick or less in thickness.

When lumber is more than 1 inch in thickness the number of feet board measure is obtained by multiplying the length in feet by the breadth in feet, and this product by the number of inches in thickness. Thus, the number of feet board measure in a timber 18 feet long, 15 in. wide, and 24 in. thick is obtained as follows:

$$18 \text{ ft.} \times 1\frac{1}{4} \times 24 = 50\frac{1}{2} \text{ ft.}$$

One-fifth more siding and flooring is needed than the number of square feet of surface to be covered, because of the lap in the siding matching.



HOW TO FORECAST THE WEATHER

Every roofer and builder is at times more or less interested in immediate weather changes and conditions. The following formula of popular weather signs was adopted a number of years ago by the Farmers' Club of the American Institute:

All storms are progressive, i. e., the entire storm area moves. This motion is in a general easterly direction except in the tropical storms, which generally pass northward along the Atlantic seaboard.

When the temperature falls suddenly, there is a storm east of you. When the temperature rises suddenly, there is a storm to the west or northwest of you. The wind always blows from a region of fair weather toward a region where a storm is forming. Cirrus clouds always move from a region where a storm is in progress toward a region of fair weather. Cumulus clouds always move from a region where a storm is forming. When cirrus clouds are moving rapidly from the north or northeast there will be rain within twenty-four hours no matter how cold it is. When cirrus clouds are moving rapidly from the south or southeast there will be a cold hailstorm on the morrow if it be in the summer, and if it be in the winter there will be a snow storm. Whenever heavy white frost occurs, a storm is forming within 1,000 miles north or northwest of you.

The wind always blows spirally around a storm center, in a direction contrary to the hands of a clock, and generally toward the storm center. When it blows from the north the heaviest rain is east of you; if from the south the heaviest rain is west of you; if from the east the heaviest rain is south of you.

WEIGHTS AND MEASURES USED IN THE UNITED STATES

TROY WEIGHT

24 grains.....	1 pwt.
20 pwt.....	1 ounce
12 ounces.....	1 pound

Used for weighing gold, silver and jewels.

APOTHECARIES WEIGHT

20 grains.....	1 scruple
3 scruples.....	1 dram
8 drams.....	1 ounce
12 ounces.....	1 pound

The ounce and pound in this are the same as in Troy Weight.

AVOIRDUPOIS WEIGHT

27 ¹¹ / ₃₂ grains.....	1 dram
16 drams.....	1 ounce
16 ounces.....	1 pound.
25 pounds.....	1 quarter
4 quarters.....	1 cwt.
2,000 pounds.....	1 short ton
2,240 pounds.....	1 long ton

DRY MEASURE

2 pints.....	1 quart
8 quarts.....	1 peck
4 pecks.....	1 bushel
36 bushels.....	1 chaldron

LIQUID MEASURE

4 gills.....	1 pint
2 pints.....	1 quart
4 quarts.....	1 gallon
31 ¹ / ₂ gallons.....	1 barrel.
2 barrels.....	1 hogshead

SQUARE MEASURE

144 square inches.....	1 sq. foot.
9 square feet.....	1 sq. yard
30 ¹ / ₄ square yards.....	1 sq. rod
40 square rods.....	1 rood
4 rods.....	1 acre
640 acres.....	1 sq. mile

CIRCULAR MEASURE

60 seconds.....	1 minute
60 minutes.....	1 degree
30 degrees.....	1 sign
90 degrees.....	1 quadrant
4 quadrants, 12 signs, or 360 degrees.....	1 circle

TIME MEASURE

60 seconds.....	1 minute
60 minutes.....	1 hour
24 hours.....	1 day
7 days.....	1 week
28, 29, 30 or 31 days.....	1 month
(30 days - 1 month in computing interest)	
365 days.....	1 year
366 days.....	1 leap year

LONG MEASURE

12 inches.....	1 foot
3 feet.....	1 yard
5 ¹ / ₂ yards.....	1 rod
40 rods.....	1 furlong
8 furlongs.....	1 statute mile
3 miles.....	1 league

CLOTH MEASURE

2 ¹ / ₄ inches.....	1 nail
4 nails.....	1 quarter
4 quarters.....	1 yard

SURVEYOR'S MEASURE

7.92 inches.....	1 link
25 links.....	1 rod
4 rods.....	1 chain
10 sq. chains or 160 sq. rods.....	1 acre
640 acres.....	1 sq. mile
36 sq. miles (6 miles square).....	1 township

CUBIC MEASURE

1,728 cubic in.....	1 cubic foot
27 cubic ft.....	1 cubic yard
128 cubic ft.....	1 cord (wood)
40 cubic ft.....	1 ton (shipping)
2,150.42 cubic in.....	1 standard bushel
231 cubic in.....	1 standard gallon
1 cubic ft.....	about 4-5 of a bushel

PAPER MEASURE

24 sheets.....	1 quire
20 quires.....	1 ream
2 reams.....	1 bundle
5 bundles.....	1 bale

MISCELLANEOUS

3 inches.....	1 palm
4 inches.....	1 hand
6 inches.....	1 span
18 inches.....	1 cubit
2.5 feet.....	1 military pace

METAL ROOFS PREVENT LIGHTNING FIRES

The following excerpt which is taken in part from an article which appeared in the Sheet Metal Worker, New York, June 10, 1921, is of particular interest to all owners of buildings. The enormous loss caused by lightning fires makes this matter very important, particularly to owners of farm buildings.

"The metal roofing industry of the United States owes a big debt to Lyon, Conklin & Co., Inc., Baltimore, Md., for collecting proof that the tin or metal roof has no equal for protecting buildings against fire when struck by lightning. Their findings are supported by the United States Department of Agriculture. It has not escaped the attention of the observing that lightning seldom sets fire to buildings having metal roofs.

Naturally it attracted the attention of Lyon, Conklin & Co., Inc., who are enterprising in their campaign to increase the sale of metal, whether in black or galvanized sheets, bright tin plate or terne plate for roofing purposes. They have for several years opened up correspondence to discover the facts about every item from newspapers sent in by their clipping bureau that mentioned a building being damaged by a lightning stroke, whether it was burned or saved. This course has amassed convincing evidence of the effective protection against lightning fires afforded by metal roofs. In their vicinity they have used newspaper space extensively to reproduce photographs showing the effect of lightning on buildings, particularly those that were covered with metal roofs. Although there were plenty of photographs selected by this concern, showing complete destruction of buildings where no metal protection was afforded, the possession of this convincing evidence was not sufficient; and it was their desire to impress the tin roofing industry with the value of the metal roof as a protection against lightning. For more than three years their engineer has been experimenting with a device capable of emitting an electrical discharge that would approximate a bolt of lightning, and which could be used to demonstrate to those who had not had the same interest in investigating the effect of metal against lightning, that it was practically invincible to lightning bolts.

The outfit consisted of an apparatus through which the electricity, available in the ordinary private office, developed a bolt of sufficient intensity to demonstrate the vulnerability and the impracticability of different roofing materials. From this electrical apparatus there extended one wire through which the electricity was discharged and

another wire which would ordinarily complete a circuit or be grounded so that the electricity might pass through without interruption. In the experiment to demonstrate the defiance to lightning offered by the metal roof, as compared with other roofing materials, there were provided miniature barns about 12x18" in size and 12" in height at the peak. These barns were made of light boards and had removable bottoms so that they could be packed with hay or excelsior to resemble the barn on the average farm where so much destruction is done by lightning. The miniature barns were covered with different materials: one with a 5-ply high grade slag roof; one with asbestos shingles of an approved type; one with slate with a single thickness and with two thicknesses; and one with sheet metal. All were provided with a down spout of copper leading a few inches below the bottom of the barn proper. In the demonstration to show the effect on the different roofs, the different barns were placed upon a platform with the wire discharging the electricity from 8 to 10" above it, and the wire that was supposed to receive the current to make a complete circuit some 7 or 8' below the bottom of the barn. Then, when the switch was turned to start the electricity through the apparatus, there was shown a blaze about the thickness of an ordinary telephone cord about 3" long shooting downward toward the roof, and in almost an instant of time the contents of the barn were set on fire from the inside and a conflagration started, except in the metal covered barn. Here, the lightning bolt was allowed to play over the metal roof many minutes, and could have been allowed to play indefinitely, with the result that it was gathered up by the metal, and carried to the corner where the conductor pipe would ordinarily be placed, ran down the pipe, and passed off in a blue blaze about 20" in length and something over ¹/₄" in diameter. The barn was then turned upside down and the removable bottom taken out, as well as the hay and excelsior with which it had been packed, and no evidence of fire was found. It was replaced, the bottom put in position, the barn again put on the test rack, and again the lightning was allowed to play on the surface of the barn for a half minute. Another examination was made and there was no evidence that the barn had been subjected to the danger of fire. These experiments were conducted in the presence of several specially invited witnesses including Charles A. Hexamer of the National Board of Underwriters from Philadelphia, Pa.; Clinton O. Richardson, president of the Board of Fire Commissioners, Baltimore, Md.; Carl W. Wheelock, chief engineer of the Association of Fire Underwriters for Maryland; John H. Kenny, secretary of the Association of Fire Underwriters, Baltimore; Albert Waldschmidt, Association of Fire Underwriters, Baltimore; Harry F. Elliott, Association of Fire Underwriters, Baltimore, and others.

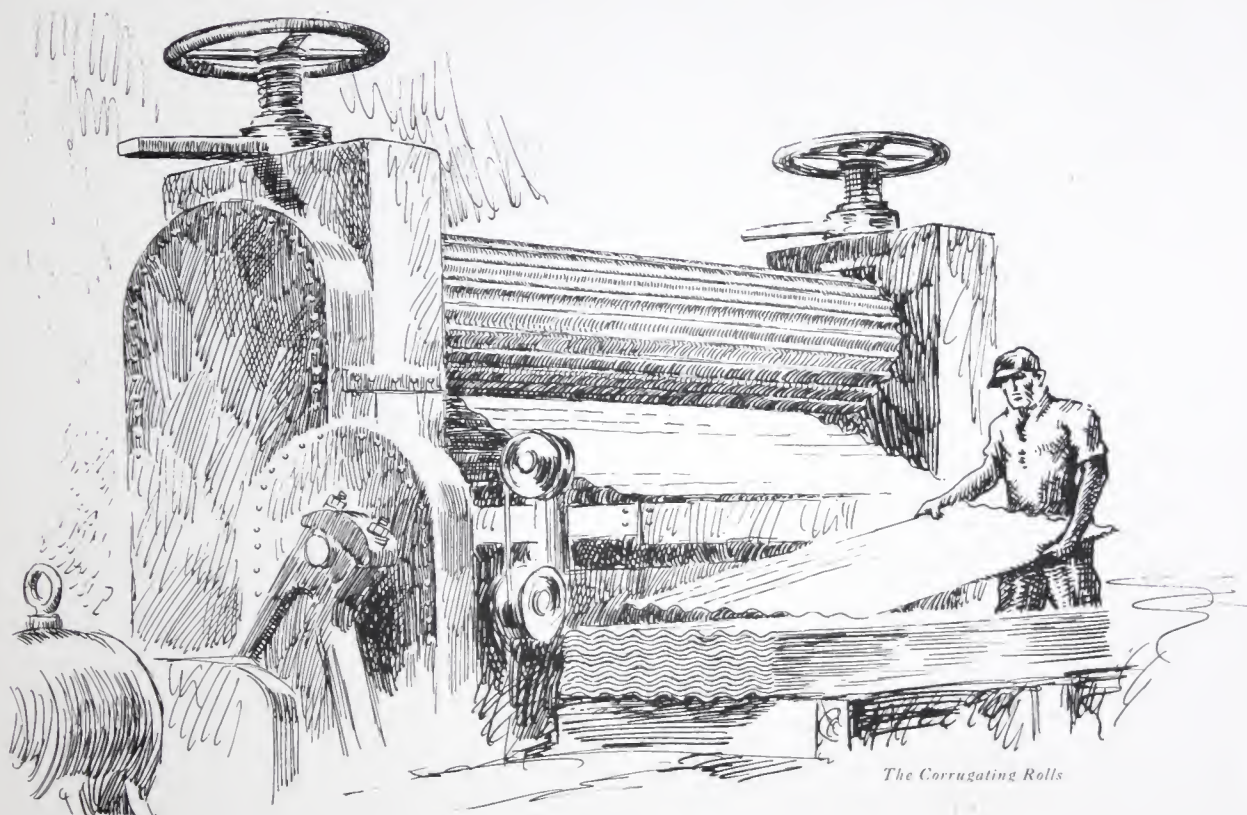
It was pointed out that there is a work to be done by the officials of cities and states who are paid to protect the citizens in showing that the insurance companies who enforce the rules do not say a word in commendation of the metal roof or give it a lower rate as it is entitled to be given.

Mr. V. N. Valgren, of the United States Department of Agriculture of the Bureau of Farm Economics and Insurance, said that the department is interested in the protection of the farmer who, when he loses his barn with the crops, and frequently some of his live stock, sustains a loss so severe that it practically puts him out of business. In an effort to aid the farmer research work has demonstrated that metal roofing is a valuable protection. The Department is also much interested in the matter of working with farmer's insurance companies of the mutual character to protect buildings, and has discovered that fire prevention by means of metal roofs, particularly in farm fires from lightning, is very effective in eliminating the loss. The metal roof not only is proof against lightning, but it is also proof against sparks such as might fall on a shingle roof. He pointed out that so far as the lightning is concerned, if the lightning rods are in good order and placed with sufficient frequency and properly grounded at the bottom, they are also a great protection against lightning. It was further pointed out that they are an additional expense after the roofing material essential to the construction of the barn has been applied, and in this point the metal roof has the advantage over the lightning rod. Extracts were read from different publications to show that in Canada the losses on farms due to fire from lightning had been more than 50 per cent.

It was also brought out that in one of the Southern states a building roofed with metal and provided with metal sidings was struck as many as thirty times by lightning during a protracted electrical storm without sustaining sufficient damage to require repair.

Use KEYSTONE Copper Steel

For Maximum Rust-resistance



The Corrugating Rolls



Highest Rust-resistance!
Made from
KEYSTONE COPPER STEEL

Back in 1884 we laid the conerstone of our reputation in the manufacture of APOLLO BEST BLOOM Galvanized Sheets. This superior product now stands, as it has always stood, for achievement. It has an established reputation for excellence.

But we have done more — *an additional element for permanence* is now incorporated by the use of a Copper Steel alloy base sheet. This is shown by the KEYSTONE which is placed in back of the AMERICAN brand on our APOLLO-KEYSTONE Copper Steel Galvanized—the most durable, rust-resistant sheets on the market today.

KEYSTONE quality is unequaled for culverts, flumes, tanks, silos, bins, roofing, siding, spouting, gutters, and all forms of exposed sheet metal work.

American Sheet and Tin Plate Company

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

Manufacturers of high grade Sheet and Tin Mill Products
for all purposes

AMERICAN—

Apollo Best Bloom Galvanized Sheets
Keystone-Apollo Copper Steel Galvanized Sheets
Black Sheets of Every Description
Keystone Copper Steel Black Sheets
Keystone-Wellsville Polished Steel Sheets
Corrugated Sheets—Black, Painted, Galvanized
Formed Roofing and Siding Products
Cold Rolled Sheets
Automobile Sheets—All Grades
Sheets for Electrical Apparatus
Special Sheets for Stamping
Keystone Copper Steel Terne Plates
Long Terne Sheets
Bright Tin Plates
Black Plate
Sheets for Special Purposes
U S S Stainless and Heat Resisting Steel Sheets

Tenth Edition



1932



